

*Village of*  
**KEY BISCAYNE**

TRANSIT MOBILITY STUDY



*Prepared by:*  
**THE  
CORRADINO  
GROUP**

*December 2015*

**DRAFT**





## SECTION 1

### I. Executive Summary

**Island living in Miami-Dade County is one of the most unique residential experiences in the world.**

Yet as the county has grown over the past several decades, the transportation challenges faced by Key Biscayne residents have become more pronounced. With 13,000 residents, changing demographics, and one ingress and egress point, the Village's quality of life is beginning to suffer.

What must be realized is that the volume of traffic using the roadway system that Key Biscayne relies on is quickly reaching a critical mass at specific periods of time. While marginal, temporary improvements definitely can be made, the capacity gained will be quickly consumed.

For decades, planners have advocated walking, biking and transit as an alternative to the car. Today, this cultural shift, which enables and encourages people to move about the community without a car, is one that is naturally occurring in society. The difference is that now it is gaining momentum more

out of necessity than choice because our roadway systems are running out of capacity. The shift is inevitable because continued expansion of the roadway systems are costly, both in financial and political terms. If multimodal infrastructure is not built to absorb the overflow as the shift occurs it is likely that the roadways of the future will resemble Calcutta, with all modes vying for roadway travel lanes, rather than an organized, segregated, safe multimodal system that can be seen in progressive communities. This shift can be accelerated through the implementation of the multimodal infrastructure and projects presented herein.

In reviewing this report the management of expectations is critical. The changes that are occurring are incremental. In all likelihood, roadway congestion may never improve. But it will worsen more slowly than if alternative transportation solutions are found. Any freed up roadway capacity



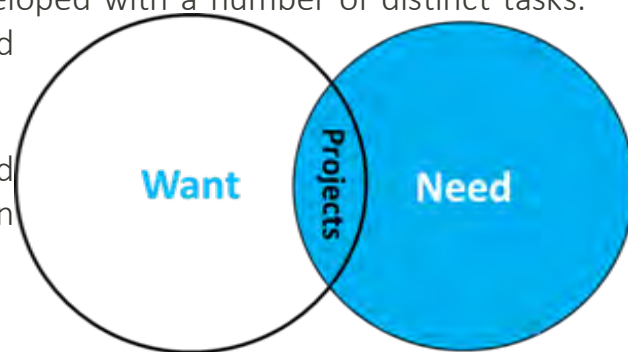
## SECTION 1

gain with these multimodal options will likely be consumed by more cars. However, through the implementation of projects such as those suggested in this study, because the additional capacity needed to accommodate them will be built in to the pedestrian, bicycle and transit systems, and supplemented by services and policies.

The Corradino Group was commissioned to develop a Transit Mobility Study to begin to address these transportation concerns. This project was developed with a number of distinct tasks: public involvement; significant data collection and analysis; and, multimodal project recommendations.

Through the course of the evaluation it was discovered that there are four distinct transportation populations in the Village including:

- ▶ Local Residents (and their sub groups, including students)
- ▶ Seasonal Residents
- ▶ Tourists and Visitors
- ▶ Workers



There are five transportation modes that were examined including:

- ▶ Cars
- ▶ Bikes
- ▶ Walking
- ▶ Transit
- ▶ Golf Carts

With two transportation types that need to be treated:

- ▶ Internal (circulating within the Village)
- ▶ External (getting in and out of the Village)

Transportation Master Planning is both an art and a science. The artistic aspect is finding out what people want through community conversations about transportation preferences. The scientific aspect is finding out what is needed through data collection and analysis. There are many ways in which to solve transportation problems. No funding agency would ever give a





community a project that is only wanted but was not needed to solve a specific problem, and be developed efficiently and effectively. In a similar vein, government should not offer people a solution they do not want, especially when alternatives that they do want exist. This study strives to build consensus on a set of multimodal projects that are both wanted and needed.

The public engagement portion of this effort focused on multiple levels including meetings with staff, elected officials and community stakeholders. A public workshop and public hearings were held. A web based program called Community Remarks was placed on the Village's Website so that people could provide comments. This resulted in over 300 remarks and suggestions. The primary concern for those who commented is traffic and congestion. This matches well with an independent survey conducted by the Village, which indicated 47% of the people believed that traffic and congestion should receive the most emphasis over the next several years.

## **MANAGING EXPECTATIONS**

The most difficult aspect of addressing the transportation issues lies in managing expectations. The Village is an island. There is one way in and one way out. The population has grown significantly over recent years, and today, what was predominantly a seasonal population has become a permanent population consisting of families with multiple vehicles and golf carts.

Over the last 11 years there have been 15 similar efforts to study traffic and transportation. In each, their conclusion has been...that there is a lot of traffic. These studies have searched for more transportation capacity in one form or another. For a citizens, staff members or elected officials, a natural question is how *this* effort will be any different than the previous ones.

The answer is that this will be different because it is understood that the planning is being done for a different market. The planning effort will be undertaken to mitigate the bottlenecks of congestion that exist in the community. Finally, this study looks at the Village as a campus.

## **EMERGING TRENDS**

The problems on Key Biscayne are directly related to the fact that the demographics in the Village have changed. Residents have moved to the Village to take advantage of the schools, community, government, and all that makes the Village one of the best places to live in all of Florida. This change comes with growing younger families, often with multiple vehicles. These are a necessity for people getting on and off the island, but almost discretionary on the island. Traffic is noticeably now year around.

Employment of the Villages citizens occurs almost entirely off the island, while nearly all of the workers on the island come from the mainland. There are many gated communities, particularly on the east side of the Village. These barriers make mobility difficult. This often encourages the unwavering reliance on cars. In Miami-Dade County a car is a necessity. It is almost the culture that people rely so heavily on them that they are reluctant to move any distance without them. It is this trend that must be reversed.

The trending is positive. A survey taken at the Key Biscayne K-8 Ceschool shows that nearly 90% of the children have asked for permission to walk or bike to school. Young people are very willing to move without a car. Nationally, it can be shown that younger people are less reliant on cars, consuming less vehicle miles each year than their older counterparts.

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	No School, Tennis Match	School and Tennis Match	School, no Tennis Tournament
	25-Mar	1-Apr	15/16-Apr
	LOS (AADT)	LOS (AADT)	LOS (AADT)
Rickenbacker (Class I)	56403	59244	41098
Rickenbacker* (Class I)	56403	59244	41098
Crandon (Class II)	31647	35673	32313

**When there is a lane closure on the Rickenbacker (Sobriety check, etc.) the LOS goes from C to F**

	With School, With Special Event	With School, No Special Event	Difference
Rickenbacker Toll	59244	41098	18146
Crandon Entrance to Village	35673	32313	3360
Intermediate Destinations	23571	8785	

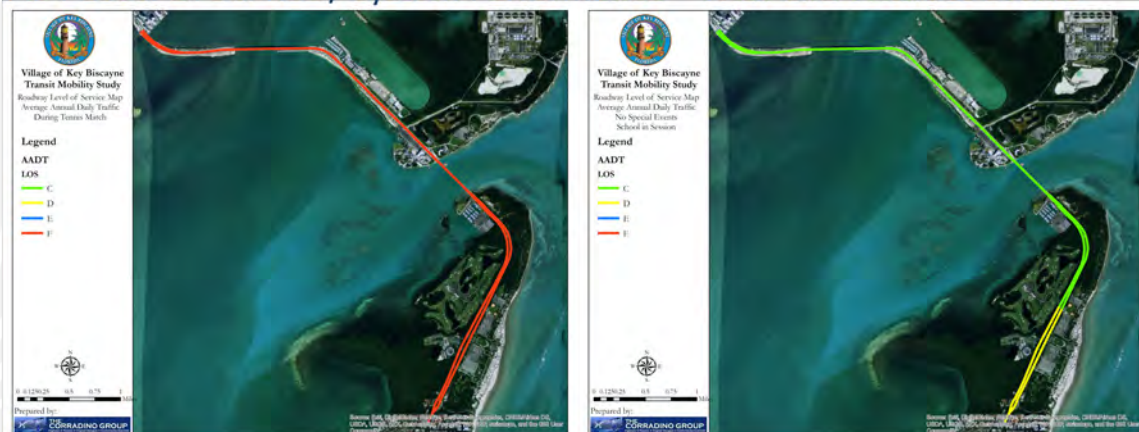
**Events like the Tennis Match increase traffic by upwards of 18,000+ vehicles, or 44%**

	With School, With Special Event	No School, With Special Event	Difference
Rickenbacker Toll	59244	56403	2841
Crandon Entrance to Village	35673	31647	4026
Intermediate Destinations	23571	24756	

**School Traffic accounts for approximately 4,000 trips**

the children have asked for permission to walk or bike to school. Young people are very willing to move without a car. Nationally, it can be shown that younger people are less reliant on cars, consuming less vehicle miles each year than their older counterparts.

### • AADT Level Of Service / System Performance – With and Without Events





## MANAGING EXPECTATIONS

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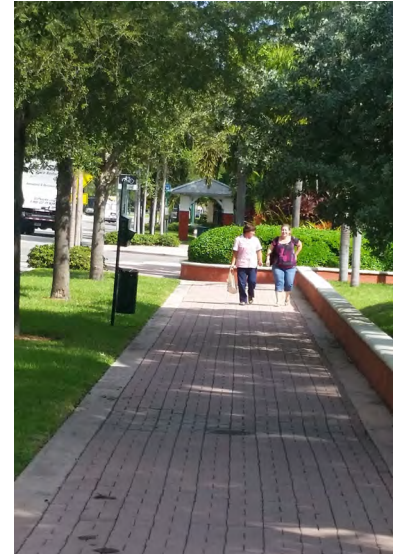
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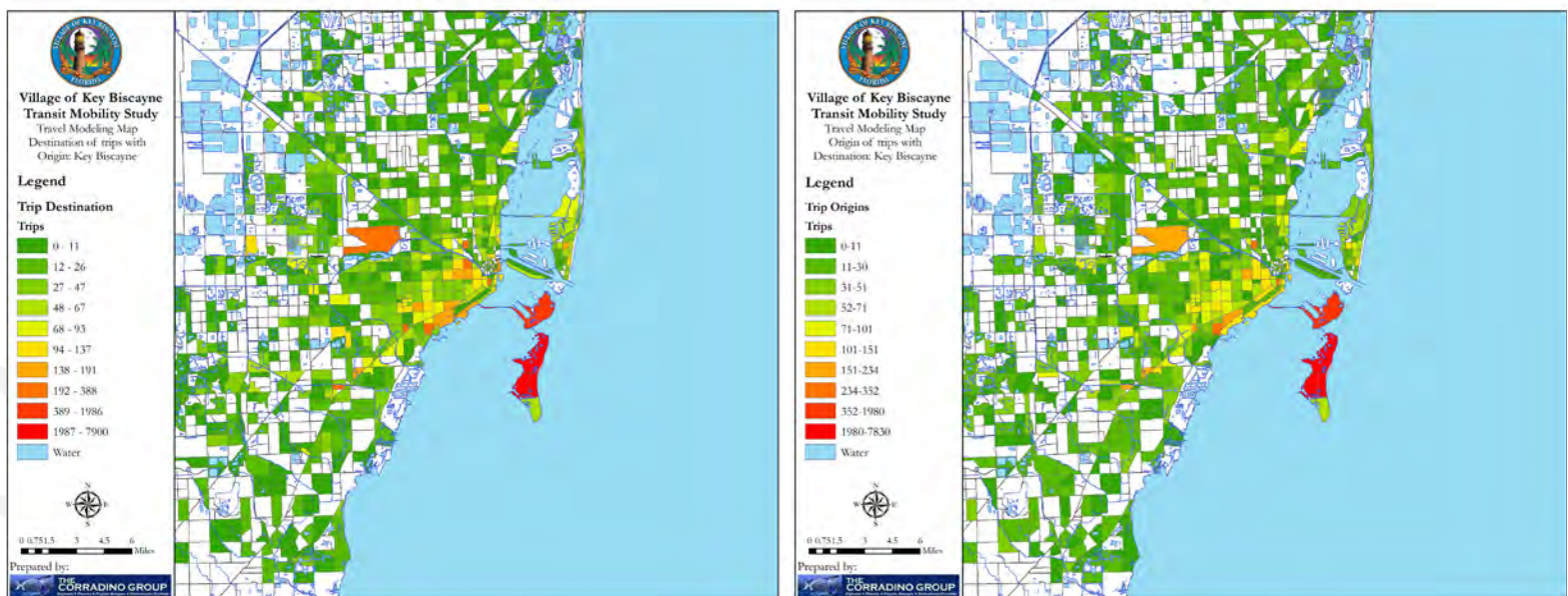
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## THE PROBLEMS

Transportation on Key Biscayne can be viewed as the people who use the system, and the modes available for them to use.

## EXTERNAL TRAVEL, WHERE ARE PEOPLE GOING

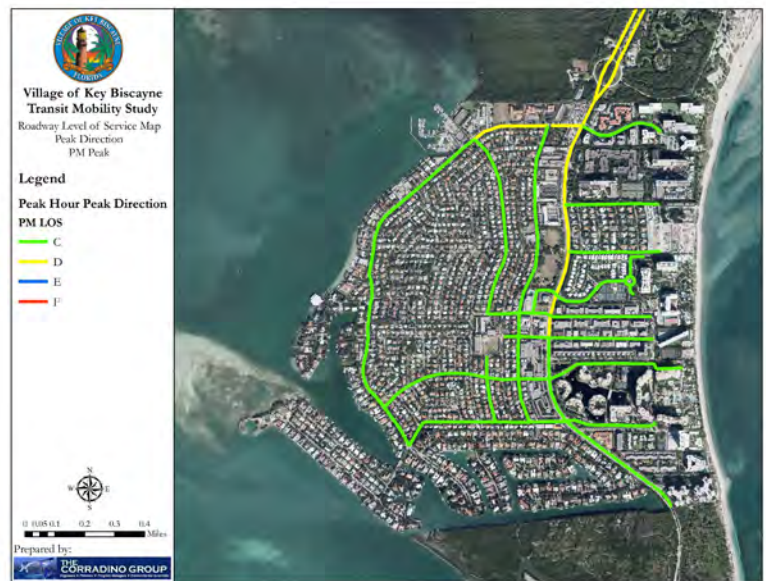
It is crucial to distinguish between internal and external travel, as they both present unique and often mutually exclusive problems. Both types of travel are complex and may rely on vastly different solutions. While examining external travel, it is known that people are going from Key Biscayne to relatively few areas of the County, including the Airport, Downtown Miami, Coconut Grove, South Miami and Dadeland. These are all areas connected by high capacity transit like Metrorail. Yet to get to and from those destinations, they must use the Rickenbacker Causeway. The local perception is that this causeway is always congested, however analysis shows that the causeway during non-event days operates at a level of service (LOS) “C” indicating acceptable traffic flow with relatively minor delays if they occur. Conversely, when events occur, like a tennis tournament, etc., the Causeway operates at a level of service “F” indicating heavy congestion and congestion delays. The issue is that there are so many event days that untenable congestion is a regular occurrence.





## INTERNAL TRAVEL

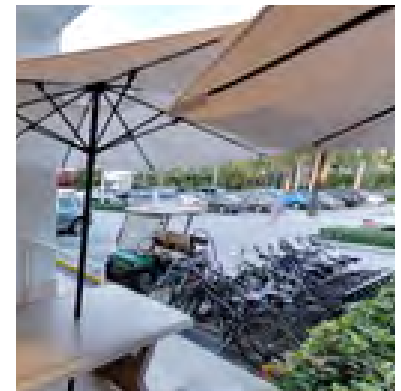
Internal travel is focused on the bottlenecks at certain intersections, primarily at Crandon Boulevard and Harbor Drive. However, parking, walking, biking, transit and golfcarts also play a component at other intersections where the cross interaction between the various modes raises questions of safety and points of intermodality within the Village. Transit coverage in the community is relatively poor because it only adequately serves the commercial areas surrounding Crandon Boulevard and is geared towards on-/off-island travel, not internal circulation.



The primary issue impacting traffic flow and congestion occurs at a number of Crandon Boulevard intersections, where intersection congestion, not roadway capacity, influences traffic. While it is not inherently recognizable through technical analysis, signal timing issues are at fault.

Congestion in much of the Village is exacerbated by people searching for parking. Within the Village center area there is a parking deficit of up to 124 spaces. To mitigate this there have been discussions regarding the construction of a parking garage. The heavy reliance on automobiles creates additional issues with congestion, location circulation, and parking.

Drivers will drive to otherwise walkable short distances to go to and from school, the parks and the shopping areas. It is believed that this is done because there is a perceived lack of adequate and safe pedestrian ways, and that there are safety issues when crossing Crandon Boulevard. The previous Safe Routes to School Study sought to remedy much of these issues. That study won a grant in excess of \$800,000 to build adequate pedestrian ways and bicycle infrastructure.



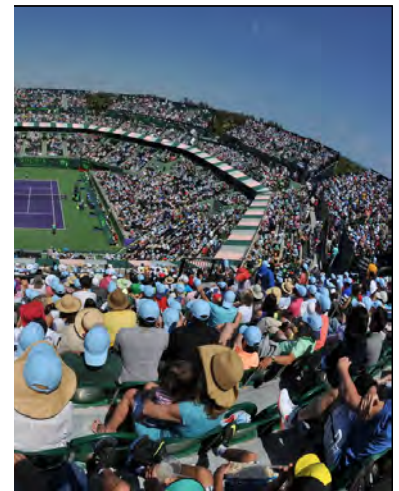
Yet the parking deficiency and congestion have begun to change behavior. This is evidenced by the fact that people are cycling. The bike racks at the shopping areas and schools are regularly filled up. The key to this effort will be to leverage the natural tendencies of certain groups of people to move without a car, by assuring that the multimodal infrastructure is in place and in excellent condition.

### SOLUTIONS – THE CULTURAL SHIFT

A cultural shift to walking, biking or using larger capacity vehicles is critical, if not inevitable in order to maintain mobility on Key Biscayne. Transportation and mobility is predicated on moving people and goods through a system. All systems have capacities, not unlike a water pipe, which is much more well defined in terms of capacity, where a certain diameter pipe will carry a certain number of gallons per hour. The roadway network is no different. As the number of vehicles reaches the capacity threshold, the system slows down. The good thing about transportation on Key Biscayne, is that it has not really begun to tap into the capacity of the sidewalks, and bikeways. Further, carrying multiple people in a vehicle, can more efficiently use the roadways. Whether this cultural shift away from the single occupancy automobile happens naturally or is incentivized is a key policy aspect of this project.

### SOLUTIONS FOR EXTERNAL CONGESTION

Solving external congestion is complex, long term, and depends heavily on huge sums of money and intergovernmental coordination. Projects listed herein are visionary, may be controversial, and are definitely intended to stimulate conversation. As previously determined, the issue is congestion on the Rickenbacker Causeway, which occurs during special events, increasing traffic by up to 44% with no alter-native routes. These events are frequent and year round. Two primary ways to mitigate this is to provide alternatives which lower general traffic, allowing for more capacity to absorb part of the special events traffic. Multiple projects have been developed which could be used, including:





- ▶ Dedicated Key Biscayne Lanes
- ▶ Event Traffic Demand Management
  - Park and Ride Facilities
- ▶ Daily Travel Demand Management
- ▶ Minimizing Lane Closures
  - Sobriety checks west of toll
- ▶ Mass Transit
  - Light Rail
  - Bus Rapid Transit
- ▶ Micro Transit
  - Water Taxi
  - Gondola
- ▶ Diversification Local Services

In general these are larger cost projects that are complex relative to planning, design, permitting, construction and intergovernmental coordination. Again the issue is capacity. Perhaps the most logical recommendation would be to suggest a dedicated lane for Key Biscayne drivers, which would enable them to bypass event traffic. These would only be active during event days and may be able to be placed to avoid specific bottlenecks.

Less intrusive but symbiotic to the other suggested items here is the ability to provide travel demand management for special events. Each event should have a detailed maintenance of traffic plan, shuttle services, and parking limitations. Overall travel demand management relies on intelligent transportation systems, real-time messaging of parking capacities, roadway conditions, etc. Today many crowd-sourcing applications similar to “WAZE,” do much of what may be necessary.

Often times when thinking of moving large numbers of people longer distances, the traditional method of thinking is Mass transit, typically in the form of Heavy Rail, like Metrorail, Light Rail, or Bus Rapid Transit, like the Busway. The cost of these systems is prohibitive in many cases, as they can be between \$50 and \$250 Million per mile. The concept of Micro Transit, more similar to a people mover in Downtown Miami, a gondola, water taxi or sky taxi, all move smaller numbers of people in smaller vehicles.





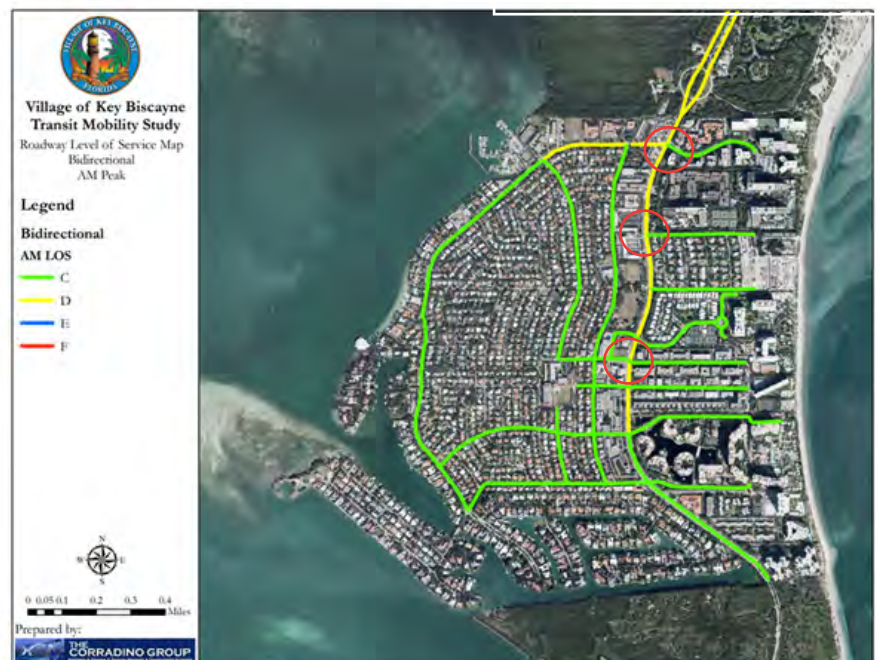
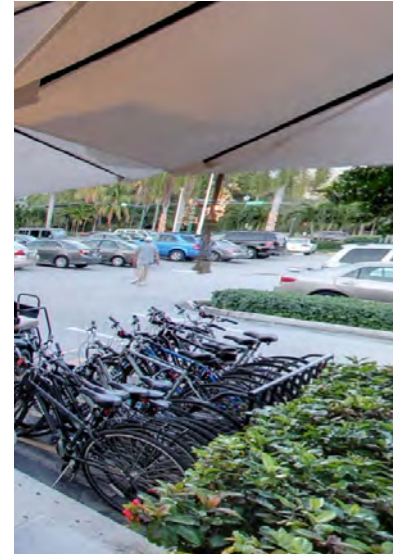
They can be significantly less expensive with price tags between \$4 and \$10 Million per mile. We know that quick connections from Key Biscayne to the Coconut Grove or Brickell areas would get most people to their destinations and connect them with the Metrorail system, providing regional access.

## SOLUTIONS FOR INTERNAL CONGESTION

Internally, Key Biscayne is congested. There are multiple, cumulative, interconnected reasons for this. They are based on failing intersections which cause bottlenecks in the system. Signal timing is not adequate or coordinated effectively. Many people have the strong desire to travel short distances. The lack of parking makes them drive around more, creating more congestion. The key to relieving congestion internally is in advancing the cultural shift of people being more willing to travel without the single occupancy vehicle. This approach is iterative and predicated on providing options and additional capacity in all the alternative modes, while streamlining the components of the existing roadway system. Additional lane miles are not planned. This will be done with projects that include:

- ▶ Intersection enhancements
- ▶ Increased Golf Cart Access
- ▶ Parking
- ▶ Transit Facility Improvements
- ▶ Bicycle Facilities
- ▶ Pedestrian Facilities
- ▶ Elderly services

The primary aggravation is where congestion occurs at the bottlenecks caused by the traffic signals. Signal timing and progression needs to be evaluated and coordinated at all of the Crandon Boulevard intersections.



Real-time adaptive signal controls are recommended. Adaptive use of a computer algorithm to detect vehicles at each intersection in real time, which can manipulate the timing of the signals based on the traffic using it at every cycle of the light. They can also be programmed to give signal priority to emergency and transit vehicles. This can increase intersection efficiency significantly. Golf carts add capacity to the system by moving people in smaller vehicles. It is important to provide increased access to golf carts from Fernwood Drive. Priority golf cart parking is recommended in the shopping areas and parks.

Parking is a definite issue. This can be handled with a combination of solutions, including: the construction of new garages; providing alternatives to the automobile with better bicycle, pedestrian and transit infrastructure so people don't have to drive, implementing designated waiting areas for pickups; more parking enforcement, and, a parking valet. A policy decision that should be considered is that of additional parking, because it is the most costly aspect of parking management.

While pedestrian infrastructure exists and is of high quality, there are several opportunities that present themselves related to providing better perception of the safety of the pedestrian system and encouraging people to use it, as opposed to very short automobile trips. This aspect of the project would focus on installing missing gaps in sidewalks, completing lighting and mitigating flooding, all in an attempt to make walking a viable option. Enhancements to intersections along Crandon Boulevard are a top priority. Installing high visibility crosswalks, crosswalk lighting and ADA complaint facilities is important. Pedestrian access to the commercial area from Fernwood Road is recommended. Programs that would further encourage parents to allow their children to walk and bike to school are important in marketing the system and perpetuating this behavior.

Bicycle safety and its viability as an alternative transportation mode is also a critical component of a multimodal transportation system, giving people options. Multiple issues exist when dealing with cycling. There are two distinct user groups.







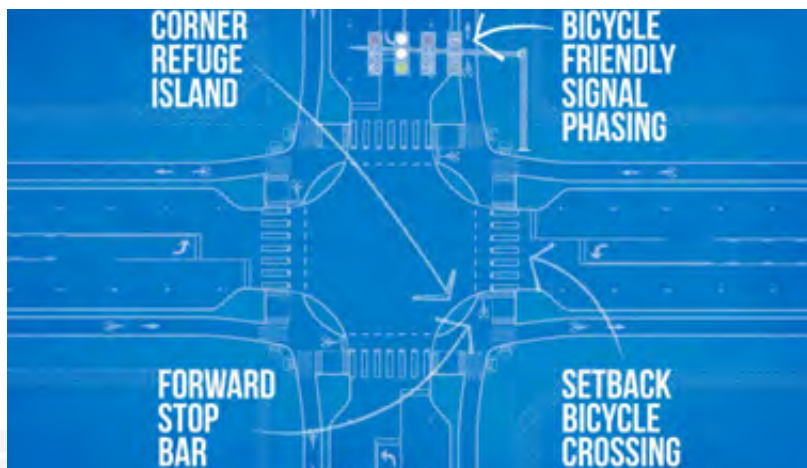
## SECTION 1 Executive Summary

The recreational cyclist, who uses the Causeway and Crandon Boulevard as a training corridor. These users ride in large pelotons, often at odd hours, and often more than two abreast, which is not legal and creates a safety hazard. This is an enforcement issue that should be acted upon. A second group of users are local people moving from place to place within the Village for various reasons. While Key Biscayne is not devoid of cycling infrastructure, and most of the island does not need additional on road infrastructure such as bike lanes, it does need attention to address speeding and safety, which should include the reduction of conflict points between cyclists/pedestrians and automobile traffic. Additional bicycle

parking amenities should be encouraged in shopping areas or mandated as part of new development.

More specifically the concept of a “cycle track” has been examined on Crandon Boulevard. Preliminary examinations show that Crandon Boulevard can accommodate cycle tracks, largely within its right of way, but would require some redesign, and perhaps some encroachment into the Village Green area depending on nuances of the design.

As part of this, intersections can be enhanced by installing corner refuge islands to shield cyclists from turning traffic. The signals themselves would be bicycle friendly, with an entire signal head dedicated to bicycle



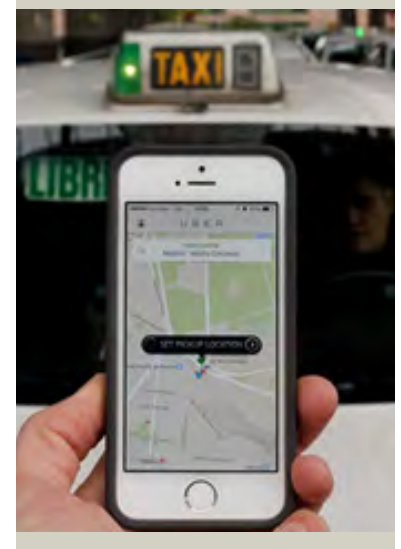
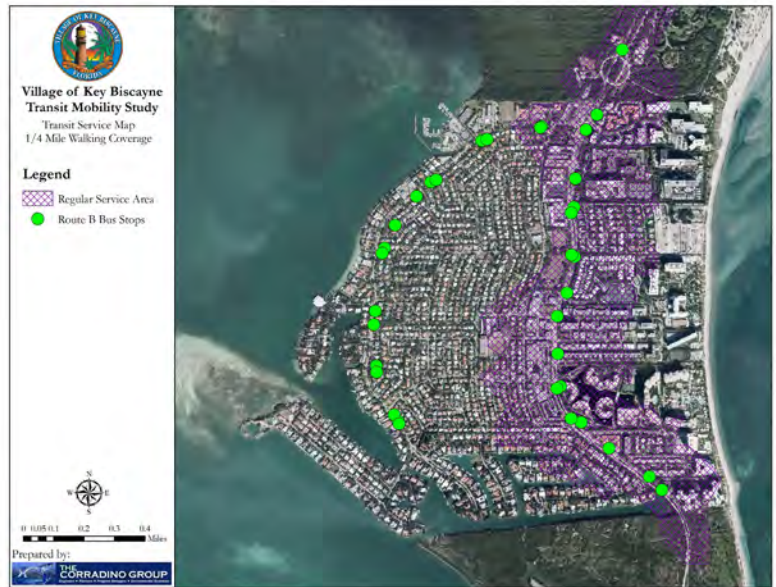


movement. The pedestrian and bicycle crossing, would be set back up the intersection to provide a clear box in the intersection. Finally, bicycle stop bars, would be installed ahead of the vehicular stop bars into the intersection and protected by the corner refuge islands and the pedestrian island. This simple design would immensely improve safety at the intersections.

For many people living on Key Biscayne, transit is not a viable option. The transit coverage is very low, and only covers the commercial areas. While residents are serviced by a spur route, this route is too infrequent to be a viable transit route. Gaps in the system are compounded by the relative lack of pedestrian and bicycling infrastructure that allow walking or biking to the bus system. To address this problem it is suggested providing transit access and viability by infilling missing links in the pedestrian and cycling system, and by making bus rides more comfortable. Where appropriate, bus stops need to provide shelter, be connected by sidewalks and have adequate signage and seating.

Internal transit should be viewed as micro transit as opposed to mass transit. This means providing mobility with smaller more appropriate vehicles, and not large 45 or 75 seat transit buses. One option is to localize the Uber concept, which is essentially a computerized demand response transit model that has been a viable option recently gaining in popularity. This concept is one that is usually employed on college campuses, and essentially functions as an internal circulator. The idea is to have a series of smaller vehicles, like low speed vehicles, (golf carts) distributed around the community. This service can be customized in a variety of ways.

It is believed that this concept would be effective on Key Biscayne. It is suggested that it be tested. If successful, there is a burgeoning technology, currently called “Easy Mile”. This is an

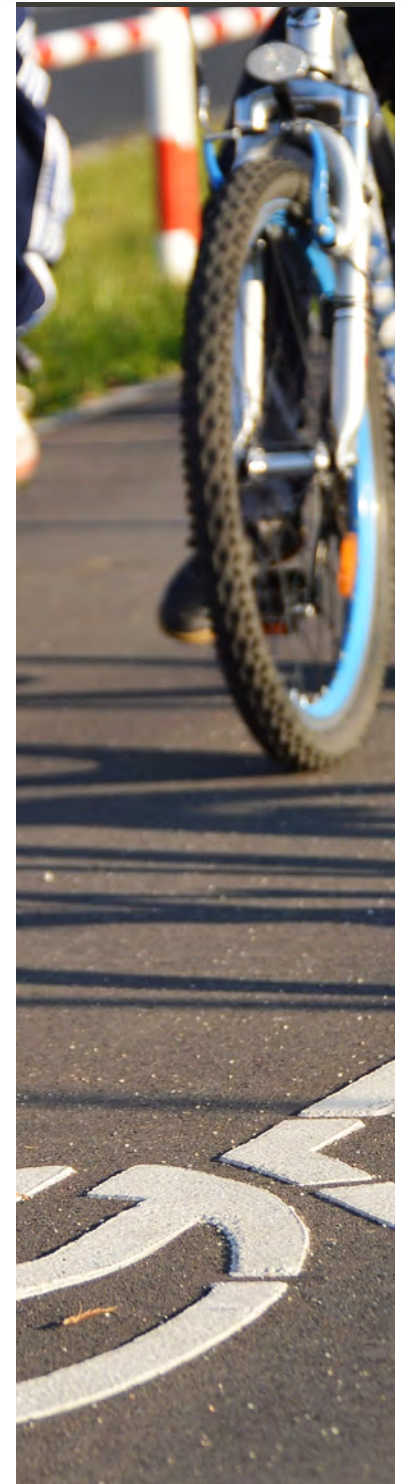


automated driverless bus, which can carry up to 12 passengers. It responds to GPS locations via the internet, is battery powered, fully automated, safe and easily maintained. The technology is coming on line this year in select locations in the United States.

A variation of this can be used to service the Village's senior population. More than 20% of the population are seniors and face mobility issues that are different from the majority of the population. This includes the ability to drive, access medical care, and in some instances difficulty in walking. In these cases additional assistance may be required. Extending independent living is an issue we are all going to face as the Baby Boomer generation ages. Doing this requires multimodal options which do not currently exist. These may include shopping delivery services, door to door transportation through the KB Uber concept and supplemental funding for special transportation series for medical appointments.

It is recommended that the Village consider these each year as funding permits, and annually move projects from either of the suggested time horizon tables into the capital improvements program.

The cultural shift, enabling and encouraging people to move about the community without a car, is one that is naturally occurring in society today, necessitated by the roadway system reaching a critical mass, and running out of capacity. The shift is inevitable, because continued expansion of the roadway network is costly, both in financial, and political terms. The shift can be accelerated through the implementation of multimodal infrastructure and projects presented in this report. As stated at the onset of this project, managing expectations is critical. Additional capacity needed to accommodate them will be built in to the pedestrian, bicycle and transit systems, and supplemented by services and policies. With the implementation of projects, quality of life will increase.





Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Racks	Bicycle	Internal	Install Bicycle Racks within the Village	Field visits established a bicycle parking deficit within the Village	The Village will fund the addition of bicycle racks at commercial and civic areas. With Commercial area installation, the Village will have to work with existing property owners. Bicycle racks should also be installed at all existing and future planned parks.	\$ 120,000
Cycle Tracks	Bicycle	Internal	Design and Construct a Cycle Tracks system on Crandon Boulevard	Enhancements to bicyclist safety on Crandon, which has the most bicyclists, can be effected through separation of bicyclists from general vehicular traffic. This is particularly important for younger riders, which are increasing in numbers within Key Biscayne due to demographic shifts and emphasis on healthy, alternative mode travel for local children. Stakeholder identified.	This project will allow the Village to redesign Crandon Boulevard with a cycle tracks system to enhance bicyclist safety and create separation of traffic. Cycle track implementation in Crandon Boulevard has multiple alternatives. This includes a two-way track to be installed on the west side of Crandon boulevard, or a one-way track on east and west sides of Crandon, following traffic direction. Each alternative bears a different cost, and a different design. Construction Cost Option 1: \$192,732 Construction Cost Option 2: \$289,098	\$ 289,098
Enhanced Bicycle Crossings	Bicycle	Internal	Provide adequate infrastructure to protect bikers when crossing major intersections and increase bicycle flow. Increase safety.	Some intersections lack the adequate space to provide refuge to bikers while waiting for a light to cross on major intersections.	Redesign of intersections to provide for bicycle refuge areas as needed, as well as differentiated bicycle crossing signals and bike pathways. Where needed, a holding area should be established at the intersections. Refuges shall be big enough to accommodate bikers and pedestrians, and timing shall be adequate as well. Signalization should indicate clearly that it controls bike movements to avoid confusion with pedestrian movement.	TBD
Bicycle Enforcement	Bicycle/Policy	Internal	Increase enforcement on bicycling laws within Village.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires additional officers to ensure appropriate Village police staffing. Cost indicated is additional yearly cost. It should be explored whether non-sworn personnel can be utilized for the function of deterrence as well. Fines should be enacted, with enforcement decreasing over time as issue ameliorates.	\$ 140,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Implementation of Safe Routes to School	Bicycle/Pedestrian	Internal	Implement Safe Routes to School report recommendations	Report recommendations provide for enhanced Bicycling/Pedestrian safety along designated routes for children	Safe Routes To Schools is a federally mandated program emergin from the Safe, Accountable, Flexible, Transporation Equity Act, a Legacy for Users (SAFTEA-LU) and continued under the Moving Ahead for Progress in the 21 <sup>st</sup> Century Act (MAP-21). It is an effort to create a more favorable environment for non-motorized transportation to and from local schools. The Village was recently awarded funding to implement the entire study.	\$ 837,531
Adaptive Signalization Technology	Roadway	Internal	Install adapative signal technology along Crandon Boulevard.	Signal timing along Crandon Boulevard is broken, resulting in a situation where intersections that can be at LOS C, are operating at LOS F.	Adaptive signalization allows for real-time adjustments to signal timing based on existing traffic. Installation of technology needed.	\$ 212,600
Bicycle/Pedestrian/Golf Cart Access to Crandon Shops	Bicycle/Pedestrian/Golf Carts	Internal	Reduce local needs to drive short distances and ease parking deficiencies at Crandon Shops while providing direct access for pedestrian and other modes of transportation through Fernwood Road	Any infrastructure improvements that encourage people to opt out of the cars when visiting the shops is a step in the right direction in reducing short distance driving. Parking spaces is a scarce commodity in Key Biscayne, and especially at Crandon Boulevard's commercial areas, as noted by public outreach and field reviews.	Enhance sidewalks along Fernwood and open the perimeter wall in the back of the shops where is found to be more appropriate. Where suitable, bike racks on the back of the shops shall be provided.	\$ 47,500

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Sidewalk Infill	Pedestrian	Internal	The purpose of this project is to fill in the gaps in the sidewalk infrastructure. The sidewalk is the most obvious element of the pedestrian network, therefore a primary objective of this plan is to provide mobility by ensuring a complete and inclusive sidewalk system. By including short, direct pedestrian connections between adjoining land uses can make walking (and bicycling) more attractive.	Gaps in sidewalk network decrease mobility for pedestrians, and improvements are needed to make walking a viable choice. Most of Village is within a 0.5 mile walk from the Civic Center and Commercial areas.	Location of missing sidewalks are noted in the map and attached table. Prioritization of these sidewalk improvements should be based on proximity to schools, parks and bus stops, and then to existing businesses. Primarily, the purpose is to create a cohesive connected walking network. This amount does not include the gaps noted in the Safe Routes to School report.	\$ 370,000
Lighting - Install LED	Bicycle/ Pedestrian	Internal	Install lighting within the Village's local roadways, upgrade to LED lights with existing lighted areas	Nighttime mobility for walking and bicycling requires lighting not always available or proper for walkers and cyclists.	The Village is already proceeding some changes to its lighting system, and the program should continue until all of the Village is complete. Replace existing bulb with new energy-efficient LED bulbs. Where new lighting is required, specifications shall call out LED bulbsLED lighting in the long run is a more efficient technology, since it reduces maintenance costs and consume less energy. In addition its users conveys a message of environmentally conscious community, which is aligned with the values of Key Biscayne residents.	TBD



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Education Safety Program	Bicycle	Internal	The purpose of this project is to assure that cyclists and motorists alike are practicing safe and courteous behavior to minimize accidents and therefore encourage more people to cycle.	South Florida is one of the most dangerous places in the nation to ride a bicycle, in large part for lack of bicycle facilities and the spatial and operational characteristics of our cities. Educating cyclists how to properly ride on our streets, as well as educating motorists how to be aware of and treat cyclists, will assist in making the roads safer.	Develop a bicycle/driver educational pamphlet, work to educate the public on bicycle and driver safety.	\$ 10,000
Village K-Uber	Transit	Internal	Create a local version of Uber which will stay solely on Key Biscayne.	Reduction of parking needs and personal vehicle use are needed. Parking study indicated that searching for parking adds to local congestion.	Implement a Village-wide Uber. Conduct implementation study to determine if the program should be Village or contractor run.	\$50,000, TBD
Village Driverless Shuttles	Transit	Internal	To develop a network of driverless transit with designated stops and/or an on-demand system.	Driverless shuttles can potentially increase cost effectiveness for a community of Key Biscayne's size in providing transit.	Evaluate driverless shuttle system's potential by looking at pilot studies in other cities in 2016. Devise means of implementation of system, and any necessary infrastructure to enhance system.	\$ 750,000
Shopping Delivery Services	Transit	Internal	Enact or encourage service to deliver groceries to residents, thus reducing number of trips with destination to supermarkets and shopping plazas. Alternatively, this can be used to enhance transit usage for those who still wish to have the shopping experience.	Beyond the comfort of having groceries delivered to your front door, a 22% or residents in Key Biscayne are older than 60 years and might be the largest clientele of this service, which has been utilized in other areas.	Encourage local shops to offer delivery services. Where needed, the Village may opt to contractually incentive the program with specific vendors.	\$ 25,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Parking Structure	Roadway	Internal	Provide more parking space to alleviate the deficit identified in the study of the Civic Center area.	The Civic Center area has a parking deficit of up to 124 spaces.	Design and implement a new structure behind City Hall. In designing the structure, it should be noted that existing parking being replaced ust be added to the total for the development of the entire structure.	TBD
Complete Traffic Calming	Roadway	Internal	Implement Traffic Calming Study recommendations	Traffic calming needs were determined in prior studies. Traffic calming based on this report is partially complete.	Continue to implement Traffic Calming Study (2012) findings and recommendations.	\$ 1,010,000
Priority Signalization for Emergency Vehicles	Roadway	Internal	Provide priority signalization to emergency vehicles within Key Biscayne.	In times of congestion with the Village, better signalation for emergency vehicles will help optimize response times. This technique has been used in other municipalities with localized congestion issues.	Install priority signal system. Emergency vehicles are equipped with a transponder that emit an emergency signal received on traffic light, thus extending the green light required to clear any queue or congestion in front the of the emergency vehicle. Specific receivers will need to be installed in all intersections. Intersections can be improved for about \$13,500 each, with transponders on vehicles adding additional costs per vehicle.	\$ 105,000
Crosswalk Light at Crandon and Mashta	Pedestrian	Internal	Install crosswalk lights at Crandon Boulevard and Mashta Drive.	Pedestrian safety will be enhanced with the addition of a pedestrian crossing signal at a controlled intersection.	Install pedestrian crosswalk signal at Crandon Boulevard and Mashta Drive	\$ 76,000
Audible Crosswalk Signalization	Pedestrian	Internal	Increase accessibility and mobility for persons with visual disability or young persons.	Increases safety for communities with a larger elderly population, children.	Audible devices typically will generate an audible sound to alert people that it is safe to cross, and should be installed at all intersections along Crandon Boulevard.	\$ 74,000
Signal Progression (Crandon Boulevard)	Roadway	Internal	Reduce congestion at intersection due to failing intersection LOS resulting from improperly timed signals.	Signal retiming necessary to eliminate failing intersection LOS along Crandon Boulevard, a main cause of local vehicular travel delays.	Each of these intersections require reconfigurations to signal timing, which will result in the intersection no longer having failing level of service. In addition, the re-signalization of these intersections, due to their proximity to each other, should be part of a greater corridor signal progression analysis to ensure that the changes at each intersection will appropriately sync to ensure improved traffic flow.	\$ 131,000

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Address Local Flooding	Roadways/ Pedestrian/ Bicyclist	Internal	Address fllooding withn Village	Certain areas within the Village flood, creating difficulties in access for vehicles, pedestrians, and bicyclists	Identify areas of flooding and ameliorate.	In progress
Pedestrian Refuge at West Enid/ Crandon Boulevard	Pedestrian	Internal	Enhance pedestrian safety at crossing on Crandon Boulevard.	Through the analysis and public involvement of this study, it became evident that the public would like safer pedestrian access to and from various locations. From site reconnaissance it was noticed that pedestrian street crossings are difficult, with pedestrians not having appropriate time to cross at certain intersections.	Install Pedestrian island as refuge area at West Enid/Crandon Boulevard	\$ 6,500
LAP certification	Policy	Internal	Coordinate with staff and FDOT to become LAP certified	LAP certification is necessary to ensure local control of grant funding administration. FDOT is requiring local recertification for all municipalities.	Update training and policies as part of FDOT program to qualify for LAP certification status.	\$ 10,000
Total						\$ 4,214,229



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Reversible Lanes on Rickenbacker	Roadway	External	Study, design, and implement a reversible lane along the Rickenbacker Causeway.	Heavy traffic on Rickenbacker Causeway during events reduce the roadway LOS from C to F.	Implement a new reversible lane on Rickenbacker Causeway. A reversible lane offers the transit management entity the opportunity to increase traffic flow in one direction based on specific traffic peaks before and after major events. Temporary traffic control plan can be implemented and removed afterwards. A toll system could be set up as part of the program, with registered Key Biscayne residents bypassing the toll.	TBD
Parking Structure (Before Rickenbacker)	Roadway	External	Locate and enter into agreement to develop a new park and ride location before the Rickenbacker Toll.	Special events at the Crandon Tennis Center and those to occur in the future once the improvement to the Marine Stadium Park are completed, have a great impact in traffic along Crandon Blvd. Having a parking structure before the toll area allows for a special events staging area and a potential park and ride for Bill Baggs State Park.	Connection to existing mass transit in the county will encourage people to use remote parking when attending major events in Key Biscayne or Virginia Key. Shuttle service will connect attendants to their venues with a simple bus ride. A potential location for a parking structure is the existing parking lot at Viscaya Metrorail station.	\$ 5,000,000
Aerial Cable Transit	Roadway	External	Create and implement a aerial cable transit sstem (gondolas) connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic, using gondolas, connecting to proposed Miami-Dade system currently under study. At approximately 18 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, with stations developed to service the route. Each gondola seats 4 to 15 people, depending on model, and travels at a top speed of 14 mph.	\$ 115,000,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Air Taxis	Transit	External	Create and implement a sky car/taxi system connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	Review pilot programs for sky taxi systems and determine how to implement. Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic. At approximately 5 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, while at the same time providing a scalable approach. Vehicles on the track can reach up to 60 mph, far higher than vehicular speeds on the Rickenbacker Causeway (45 mph). Each 4 person vehicle costs approximately \$25,000 to \$30,000. Additional costs include station areas for the transit service.	\$ 36,000,000
Bicycle Enforcement (Rickenbacker)	Policy	External	Increase enforcement on bicycling laws on Rickenbacker Causeway.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires coordination with Miami for enforcement.	NA
Rickenbacker Causeway Authority	Policy	External	Examine if and how a Rickenbacker Causeway Authority could be created.	While the administration of the Rickenbacker Causeway directly affects all aspects of Key Biscayne life, little control is available in its governance. The creation of an authority will not only allow for toll funds to be directly channeled towards localized improvements, but will also allow for a more equitable seat at the table for all parties.	Review existing legislation and conduct intergovernmental coordination to create a governing body designed to enhance the administration of the Rickenbacker Causeway.	\$ 10,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Intergovernmental Coordination	Policy	External	Coordinate with City of Miami, Miami-Dade County, MDT, and Bill Baggs State Park	Roadways, sobriety checkpoints, event planning, permitting and mangement have effects on Rickenbacker Causeway that have adverse effects on Key Biscayne but are under the jurisdiction of the other places.	Coordinate with other local governmental authorities regarding events at locations along the Rickenbacker Causeway, including major events and sobriety checkpoints. The village should make efforts to increase coordination with the development of certain events to mitigate impacts on local traffic.	NA
Address Student Busing Issues (MAST)	Transit/Policy	External	Address busing capacity shortage for MAST	School busing undercapacity for MAST students from Key Biscayne. Students reported as sitting on the floor of the bus, and other issues causes parents to drive their children more to school, increasing local traffic and congestion at Crandon/Harbor.	Negotiate for more school busing. Alternatively, purchase buses and run morning shuttles. Can be incorporated into roadway and other transit programs.	\$ 300,000
Total						\$ 156,310,000

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Water Taxi	Transit	Internal/ External	Develop a water taxi pilot program, with stops in Key Biscayne, modeled after the 2010 Virginia Key Master Plan.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted.	The development of a water taxi system will require the creation of routes, associated headways, and the procurement of water taxis as well as potential construction of docking areas. Marketing is also necessary, as is intergovernmental coordination for transit and permitting purposes. The cost estimate provided is for a 1 year pilot program.	\$ 630,000.00
Bike Share (Citibike)	Bicycling	Internal/ External	The purpose of this project is to provide an expansion to existing bicycle rentals options on Key Biscayne, and an alternative mode for outside visitors.	Increased bicycle access may lead to increased bicycling and increased mobility. This will provide additional impetus for riders from Citibike, which connects to Downtown Miami and Coconut Grove.	Install Bikeshare Stations on Key Biscayne, work with City of Miami, Bill Baggs State park to locate stations. Negotiate with CitiBike	\$ 40,000.00
Bill Baggs Information System	Policy/ Roadway	Internal/ External	Develop an information sharing system for Bill Baggs capacity to reduce vehicular trips to the park.	Bill Baggs park receives close to a million visitors each year. When at capacity, drivers do not know, and cross into Key Biscayne, creating additional unnecessary traffic.	Work with the park to create an app or data system, which would then be available to access on smartphones, websites, and be posted before the Rickenbacker Causeway's entrance. In developing this information system, education about alternative modes, such as bicycling and transit, should be provided as part of the system.	\$ 50,000.00
Bus Stop and Transit Planning App improvements (Pilot Program)	Transit	Internal/ External	The purpose of this project is to make transit more attractive to potential riders by providing a transit trip planning and time application at key locations in the City. While most apps will require a phone, this will be designed so as to increase public access, taking into account the lower usage of technology utilized by the elderly in the community.	Improvements to Transit amenities regarding trip planning will increase system accessibility and potentially raise ridership.	Alongside internal transit, the Village will install interactive signs at specific stations, which would involve an updatable electronic sign linked to the current real-time system utilized by the MDT. In addition, the app will be developed in such a way that riders can select their destination on the screen, via selection of specific stops and have listed for them the buses they must take, where to transfer if needed, the bus times, and other pertinent information. The app should be structured to incorporate the desired internal transit system to be utilized by Key Biscayne.	\$ 70,000.00
Total						\$ 790,000.00





## II. Community Overview

As unique as the Village of Key Biscayne is, the same can be said for the existence of traffic and congestion and how best to deal with it. Key Biscayne's traffic exists on two distinct levels: one of internal circulation, and one of external connectivity constrained by the fact that for Key Biscayne, there is only one road into and out of the island community and the paths surrounding it.

What is known about Key Biscayne from a demographic standpoint is that it has a population of about 13,000 people, in about 4,300 households (US Census 2013). Each day, this population shrinks as about 4,000 workers leave the community, and about 2,700 come in to work. Less than 500 residents report working on Key Biscayne, not

including those who report working from home. The working population is thus highly mobile, creating congestion. On any given day, 2/3 of the total population does not follow regular commuting patterns, which shows that peak hours may be different than in traditional communities. Key Biscayne is also unique in the level of recent and projected construction activity. At the point, nearly 60 projects are under construction, drawing construction workers and their equipment onto and around the island.

Compared to Miami-Dade County, the proportion of children and elderly as portions of the population in Key Biscayne are higher (Figure below) and significantly so for children.

Age (US Census 2013)	Key Biscayne	Miami-Dade	Florida
17 and younger	25.7%	15.3%	15.3%
18-44	28%	38.2%	34.3%
45-64	29.4%	32.1%	32.6%
65 and Older	16.9%	14.4%	17.8%

Key Biscayne is increasingly becoming a community with families and children. Over the past decade, the Village has seen a significant increase in population (10,507 pop, in 2000), partially due to the fact that the economic downturn was not as pronounced in the area as evidenced by the construction of several condominium complexes in that time period. With the advent of the opening of the new high school (MAST Academy) the population makeup has begun shifting. Families with children have moved into the community, transforming a neighborhood formerly with more seasonal residents into a more permanent, year-round constituency. This population brings with it multiple vehicles, so that its family members can get to where they need to go on and off the island.

Vehicles are not in short supply on Key Biscayne. Of the 4,347 households, all but 166 of them have cars. 2,189 households or 50.3% of all households, have more than 2 cars. 2,766 households or 63.6% of these households have 2 cars or more. This equates to, at a minimum, at least one car for each resident aged 18-64 within the Village. This is not unusual given the lack of or perceived lack of transportation options and the need for vehicles may be further exacerbated by the fact that Key Biscayne, given its low altitude and exposure to the Atlantic Ocean, is generally one of the first communities to be evacuated in hurricane weather. In addition to these vehicles, the Village allows golf carts on local roads. The number of registered golf carts has risen steadily since 2010. There were 229 in 2013, this number has nearly doubled to 445 in 2014.

Key Biscayne, in regards to transportation planning, has 4 distinct populations:

- 1) Local residents (and their subdivided groups, including students);
- 2) Seasonal residents;
- 3) Tourists/visitors (which may be further subdivided into those with Key Biscayne as a destination and flow-through traffic to Bill Baggs State Park to the south); and,
- 4) Workers.







Effective transportation planning is both an art and a science. The artistic aspect is finding out what the community feels its issues are and how they believe best to fix them. This defines the projects and determines what is wanted. The scientific aspect is in collecting and analyzing data to determine the severity of the issues and how efficient and effective various mitigating strategies are in ameliorating them. This defines what is needed. In any effort similar to this there are multiple methods of attaining success. The resulting plan will be a prioritized listing of preferred projects by modal category, with detailed opinions of cost. Each will be able to form the basis of annual capital improvements elements. Emphasis is placed on making this plan sustainable. Formulas and data collection will be replicable and more easily updated in the future.

The first aspect of this project was to interact with the users of the system. These stakeholders consisted of staff, elected officials and stakeholders. In addition to one on one interviews, an interactive web based program called Community Remarks was developed and placed on the Village's web site so the public could provide comments.

The issues and potential solutions are diverse. They can be broken down in to several primary categories. Obviously, the major point of emphasis stems from traffic congestion:

*First* as it impacts Crandon Boulevard

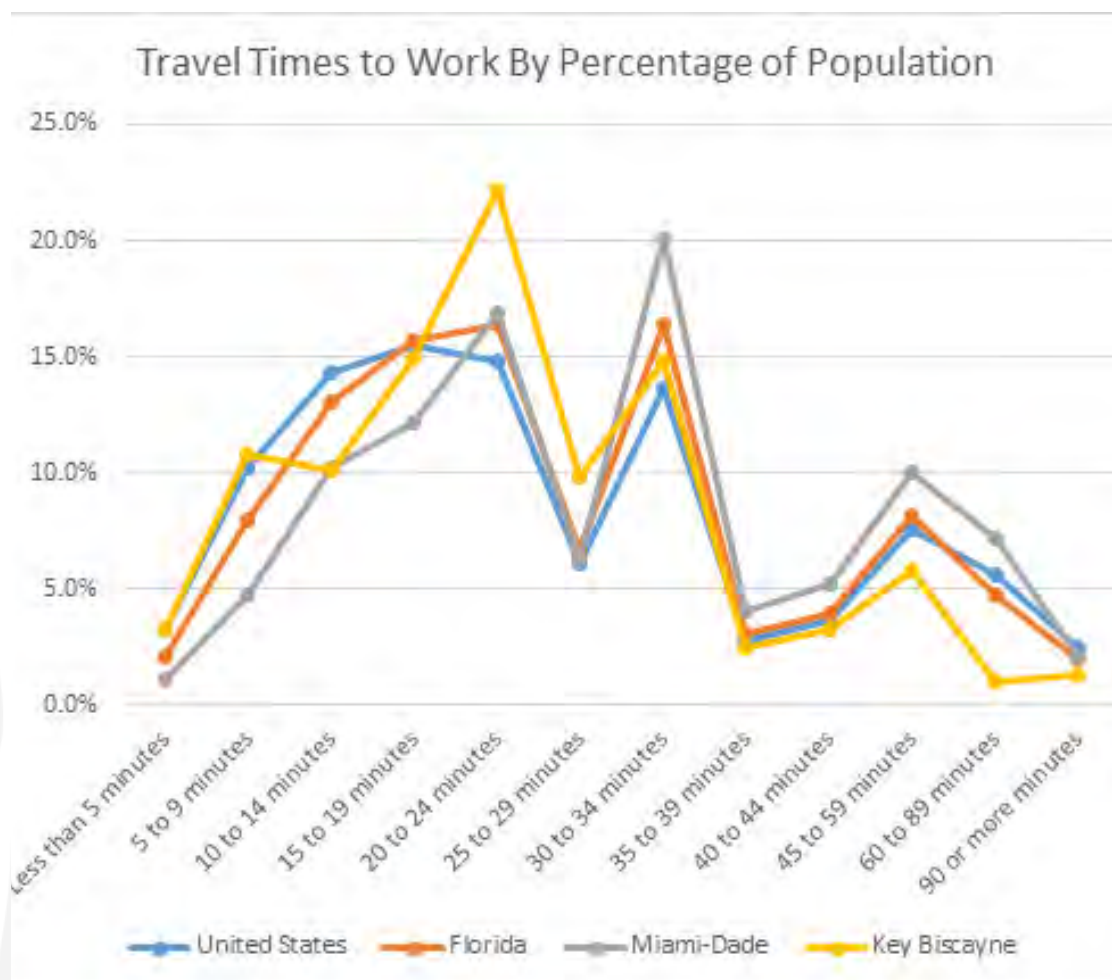
*Second* how it impacts the interior roads of the Village

A major source of congestion is not really within the control of the Village, as it relates to traffic congestion on the Causeway generated by other destinations.

Traffic and congestion creates issues across the Village, specifically with the use of each of the alternative modes including pedestrianism, cycling, transit, the use of golf carts, and parking. This negatively impacts quality of life.

This congestion concern is reflected in the location of employment and travel time to work. Local knowledge of Key Biscayne residents indicates short distances to work. Yet, the proportion of the Key Biscayne population with a 30 minute or less commute to work is generally higher than the National, State, and Miami-Dade County averages, indicating localized mobility issues which add to travel time.

The solutions to these problems will vary greatly and ultimately their implementation will be one of community preference. Suggested solutions will multi-modally deal with physical, technological, cultural and policy improvements.





## EMERGING TRENDS

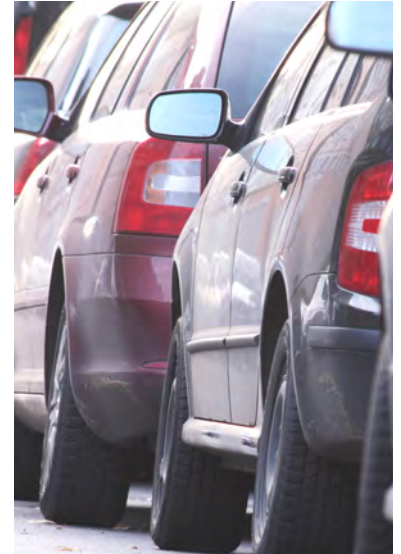
The problems on Key Biscayne are directly related to the fact that the demographics in the Village have changed. Formerly a community of more seasonal residents, over the past decade it has transitioned into a more full time population. Locally, Miami-Dade County residents have moved to the Village to take advantage of the schools, community, government, and all that makes the Village one of the best places to live in all of Miami-Dade County. This change comes with growing younger families, who often have multiple vehicles. These are a necessity for people getting on and off the island, but almost discretionary on the island. Traffic is noticeably now year around.

Today, the population is young, affluent, educated and highly mobile. Nearly 100% of the households have cars. Nearly 70% have more than one car, and nearly 70% drive alone.

While 37% of the population is in the work force, only 3% work in the Village. Each day the equivalent of over half the population move through the intersection of Crandon Boulevard and Harbor Drive in the morning and again in the evening. Employment of the Village's citizens occurs almost entirely off the island, while nearly all of the workers on the island come from the mainland.

There are many gated communities, particularly on the east side of the Village. These barriers make mobility difficult. This often encourages the unwavering reliance on cars. In this county a car is a necessity. It is almost the culture that people rely so heavily on them that they are reluctant to move any distance without them. It is this trend that must be reversed.

That opportunity does exist on Key Biscayne. It is a compact area, of about 1.5 square miles, and has a density of about 6,600 people per square mile. This is roughly the density of Los Angeles, San Francisco, or some larger college campuses. Comparatively, Pinecrest has a population density of about 2,500 people per square mile, and Coral Gables, has a density of 3,500 people per square mile. Both of these communities have well-connected grid roadway systems, yet are still experiencing congestion.



The trending is positive. A survey taken at the Key Biscayne K-8 Center school shows that nearly 90% of the children have asked for permission to walk or bike to school. Younger people are very willing to move without a car. Nationally, it can be shown that younger people are less reliant on cars, consuming less vehicle miles each year than their older counterparts.

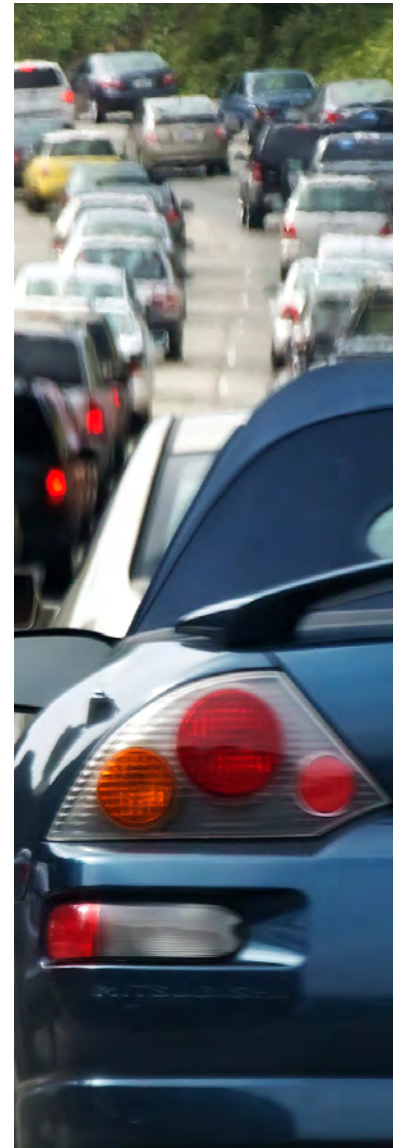
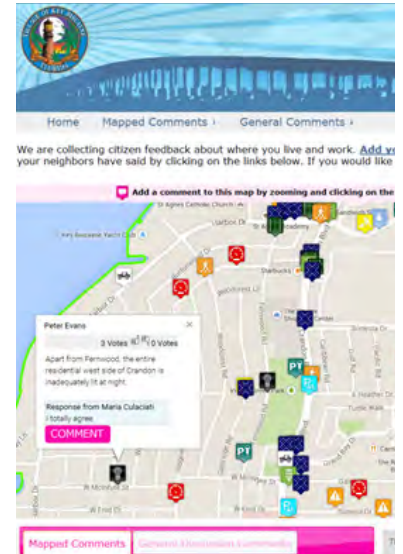
### PUBLIC ENGAGEMENT

Citizens were engaged through the use of online media, such as Community Remarks, a web-based tool which allow residents to provide feedback on transportation in the Village. Over 250 comments were recorded. Additionally, each member of the Village Council was met with to discuss their constituents concerns Meetings with local community groups, such as the Chamber of Commerce were conducted to obtain a better gauge on existing local issues.

The concerns from the various stakeholders have been organized into logical categories and summarized below. These were initially presented at a public workshop which was held in November of 2015. During this meeting a summary of the project was provided as were the conceptual projects by mode. A lengthy discussion was held and individual projects were debated. There was a consensus on the list of projects, and to proceed with the final costing and prioritizing of the efforts.

### AUTOMOBILE CONGESTION

The effects of the traffic and its resulting congestion is first noticed on Crandon Boulevard. This congestion then creates a backflow across the community, impacting many aspects of mobility and everyday life. As traffic worsens over time, congestion will increasingly impact the interior roads of the Village. This will not only change how cars move but impacts the use and patterns of pedestrians and bicyclists. A more onerous problem is traffic on the causeway. The slightest disturbance in the capacity of the causeway for a special event or an accident has sever effects on ingress and egress of the residents.





Several locations along Crandon Boulevard have been noted as problematic. Site visits and traffic counts support these observations. The intersection of Crandon Boulevard and Harbor Drive, has particularly been observed to be congested. The area near St Agnes Church is congested mainly in the morning peak hours. There are multiple schools and shopping plazas that contribute to this. An observation of signalization and signal function shows that there appears to be a lack of coordination of these signals. This creates issues entering and exiting this intersection in the morning. Better synchronization of the signals at each intersection along Crandon Boulevard would go far in mitigating residents' concerns. It has been suggested that multiple ingress and egress points at Key Colony should be examined.

As traffic on Crandon Boulevard worsens, human nature and traffic behavior dictate that people spill onto or back up onto the interior roads. Fernwood Road is one of these transitional streets that plays multiple roles, separating residential and commercial areas. Considering whether or not to allow vehicular access to shopping areas from Fernwood Road would impact the flow of traffic and the nature of the road and have varying effects for differing user groups.

### PARKING

The commercial areas are said to be plagued by a lack of parking, particularly around lunch time. There have been discussions related to the construction of a new parking garage. The police parking lot has been identified as a desirable location. This would serve to potentially provide parking at ground level for police, and on the second level for Village employees. The third level would be for residents. There is a definite desire to find more parking spaces. Funding and plans already exist for such a facility.

All the congestion on Crandon and on the interior roads creates and compounds a secondary problem. A solution would be that encouraging people to walk would minimize congestion, yet the congestion has made crossing intersections and walking along streets feel dangerous and serves as a deterrent to pedestrianism.



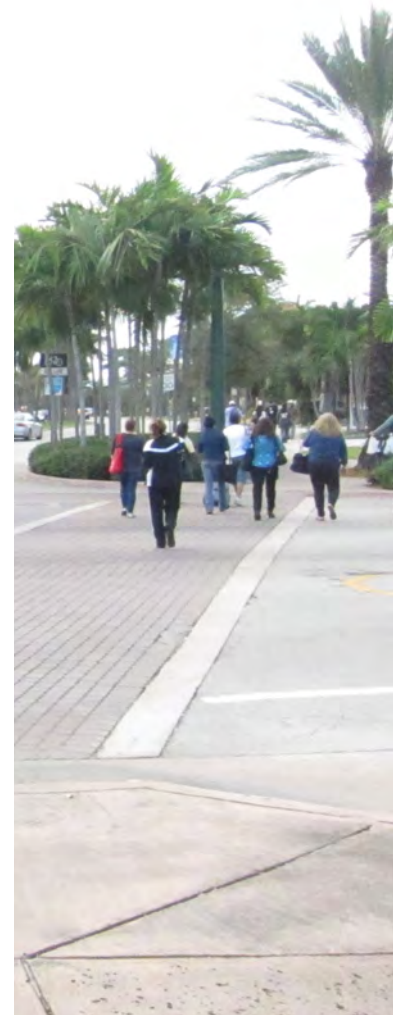
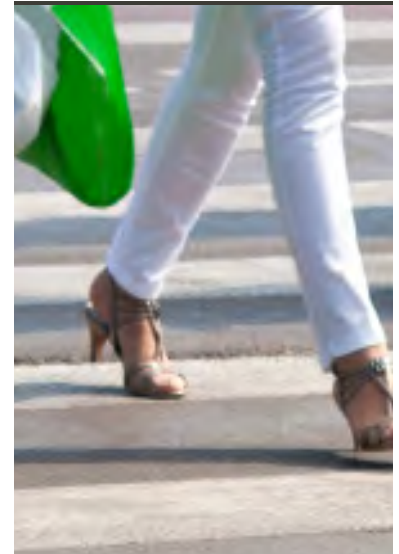
## **WALKING**

The most significant walking population are those doing it to get to and from school. Not coincidentally, the pedestrian's main problem appears to be on Crandon Boulevard. Pedestrian crossings here are not necessarily where people want to be crossing. Thus pedestrians don't cross at the designated crosswalks. The police have observed that the signage has changed some behavior, but pedestrians are getting complacent, and putting themselves in dangerous situations.

As the population shifts to younger families with school aged children there is definitely a need to create safe pedestrian routes and crossings for this group. Observations show that much of the morning traffic is fueled by the schools. Access to schools is hampered by a lack of adequate paths, crossings, striping, signage and street furniture, like bike racks. To solve this problem each street that connects to the school should have a sidewalk. There has been talk of incentivizing biking and walking to school. This would need to be coupled with safe paths and other policies like early dismissal or no vehicular zones. Children also have been seen getting around via skateboard. Yet, even on streets with sidewalks, pedestrians have been noticed walking in the street. A more adequate pedestrian network will serve in drawing choice walkers, those with access to vehicles out for more than exercise.

## **BIKING**

Cycling is a multi-faceted issue. Cyclists come in many forms. The most basic form is the cyclist who is using the mode for transportation. These people, including school children are most comfortable on multi use paths or bike lanes. The more sophisticated cyclists, which use the community to train or for long distance speed rides, are not satisfied with paths or physically separated lanes, and even have a difficult time confining themselves to a single bike lane. Law dictates that they should not ride more than two abreast, yet large pelotons can be seen in violation of this on a regular basis.





## **TRANSIT**

A third way of moving people without cars would be with a transit system or circulator route. This is being examined. Routing focused on schools or shopping trips can be developed. There are no transit dependent riders living on Key Biscayne, so any system would need to be competitive in the travel time, convenience and cost of use of a private automobile or golf cart.

## **GOLF CARTS**

As an alternative to the automobile for internal circulation, there is emphasis placed on golf carts. This is a viable alternative largely because they are smaller and take up less space. There are inherent issues with this. It has been observed that these can be overloaded with passengers not safely belted in. The proper use of these vehicles coupled with policies to accommodate them and incentivize them can be helpful.





### III. Background Information

#### COMMUNITY DIMENSIONS AND LAND USE

Key Biscayne is a small community of 1.5 sq. miles, approximately 1.4 miles in length N-S and E-W at its widest points. Crandon Boulevard provides the only arterial for the community. Most of Key Biscayne is within a 1/2 mile radius of Crandon Boulevard, indicating that if the correct destinations exist, there should theoretically be high levels of pedestrians coming from and to the neighborhoods. The majority of the road network is comprised of small residential streets.

The commercial area of the Village primarily exists along Crandon Boulevard. Configuration of the commercial area is primarily strip mall in design, with parking lots in front. Parking is at a premium within Key Biscayne. Crandon Boulevard provides an E-W split in land use. The west side of the island are more detached family housing, low density in nature, with the east part of the island primarily medium and high density multi family residential and hotel uses. The Existing Land Use Map and the Future Land Use Map for 2025 show no change for the community.

Though technically built-out, continuous construction/reconstruction of housing currently brings additional workers into the area.

Population density, while technically higher on the east side due to the high-rises, is spread out throughout the island. This is due to the concentration of small lots on properties west of Crandon Boulevard, resulting in a moderate density area.



## WORKFORCE AND SCHOOL TRAVEL CHARACTERISTICS

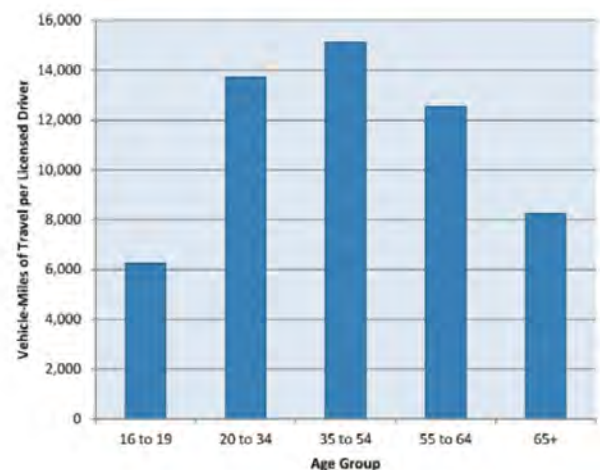
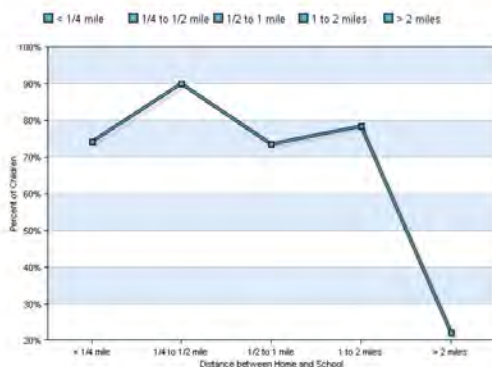
Key Biscayne has a population of 8,894 persons 16 and older; of these, 4,843 constitute its resident workforce. Inflow/Outflow analysis of the community indicates that only 477 people work and live in Key Biscayne. There is a net outflow of people in the community when it comes to the workforce, with 2,737 people coming into the community but 4,183 people leaving for work. However, Key Biscayne is surrounded by county and state parks which are popular tourist destinations, and thus have a large number of people coming in from outside of the community. As expected given the land-use distribution, the areas of highest density for the workforce are along Crandon Boulevard, with a higher concentration in the eastern part of the community, where the Commercial and hotel industry exist.

3.82% of the population is aged 15 to 17 (US Census 2013), and thus constitute part of the daily traffic out of the community, as some of these students will commute to Coral Gables or the MAST Academy for school. An additional portion of the student population that elects to attend Ponce De Leon Middle School in Coral Gables would also add to this number.

The workforce above vary in terms of modes, 70.6% drive alone, 4.1% of the overall population carpool with approximately 75% of workers driving. This trend is less than that experienced outside of Key Biscayne, while the carpool population's percentage is consistent with trends seen outside of Key Biscayne. Public transportation usage is low, at 1.0%. 3.7% of the population walk, which is somewhat consistent with areas outside of Key Biscayne. 5.5% traveled by some other means according to census data.



Percent of children who have asked for permission to walk or bike to/from school by distance they live from school





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## SECTION 3 Background Information

### WHY THIS PROBLEM

There is a distinction between internal circulation and external ingress and egress. The internal circulation problems may be able to be mitigated through cultural, physical, or technological changes to how and why we get around. Issues of external flow are beyond the direct control of the Village. It will take high levels of coordination with parties that may not share the same goals as the Village, and to truly mitigate can be extremely costly.

Internally, the issue relates to the new demographics. Key Biscayne has 13,000 inhabitants and nearly as many cars. Using those cars is a necessity in South Florida, particularly for local residents when they need to get to destinations off the Island. Using these vehicles to circulate to within the local area can be utterly overwhelming to the system. Even the conversion of internal automobile trips to golf cart trips can still cause congestion. It is also true that few people who live in the Village, work in the Village. It is an absolute necessity for them to use a car to travel on and off the island for activities like school and shopping. A cultural shift to walking and biking or larger capacity vehicles is inevitable in order to maintain mobility. Whether this shift happens naturally or is incentivized is the essence of this project.

A preponderance of the issues related to traffic stem from external sources. There is one way in and out. Weekend and weekday traffic pose different problems. Bill Baggs State Park creates a tremendous draw of over a million people per year. This consumes a large amount of capacity. Additionally, both regular activity and special events create additional pressures on the local network, especially at the ingress and egress to the Crandon Park facilities, including the marina, golf course, beach and tennis center. The Miami Seaquarium, Virginia Key Beaches and potential use of the Marina Stadium add to this. Each of these have special events, most notably frequent triathlons, the tennis tournament, etc. Add to this an accident and traffic flow can be shut down quickly. Residents are significantly impacted on a regular basis.

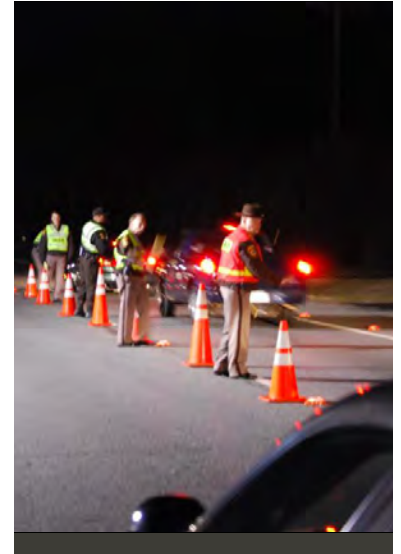


During almost any of these events Crandon Boulevard between Bear Cut Bridge and Harbor Drive can be congested. The issue of adding capacity is prevented by the Matheson Park Master Plan. Coordination with the County, City of Miami and event holders therefore is critical. Exploration of tunnels or pedestrian bridges across Crandon Boulevard for the Tennis Tournament should be examined. It has even been mentioned that the Village explore taking control of this road within the Villages boundaries. A multijurisdictional Causeway Authority could be explored to consider the impacts of the events on all the populations.

It is critical to the lives and safety of everyone on Key Biscayne, whether residents or visitors, that emergency services function within a 15 minute threshold. Even multijurisdictional policing activities can have a negative impact on flow for residents. It has been observed that DUI Checkpoints happen at an inappropriate time such as +/- 8:00 PM which can slow flow for Key Biscayne Residents.

All those involved in emergencies that happen in the Village need to be taken off the Island to reach care facilities. With congestion on the causeway this task is complicated. Bottlenecks occur at Bear Cut and the Rickenbacker Toll. The Fire Station, proximity of the traffic signals and the emergency light all create issues for emergency movement and pedestrianism.

As part of the background information analysis, the following plans as they relate to Key Biscayne's land use and transportation planning were reviewed. As can be seen from these studies, many of the issues have been raised in the past: congestion, signal timing and others.



### CRANDON BOULEVARD MASTER PLAN | 2004 C3TS

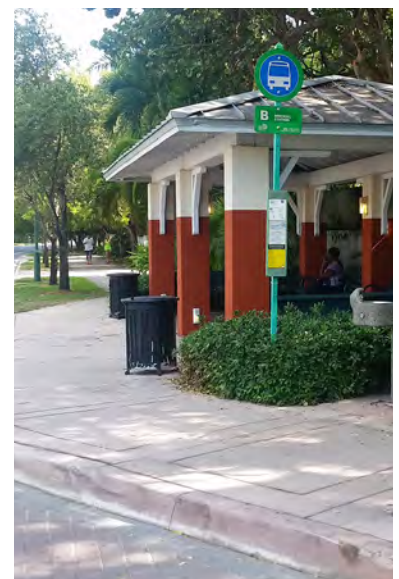
This master plan for Crandon Boulevard had the following goals: improved public safety, easing of traffic congestion, traffic calming, pedestrianization, improved mass transit, and streetscape improvements. The study examined trolley service on the island, but recommended further study in the future. The study examined golf cart use in the Village and recommended allowing access to commercial centers on Crandon Boulevard from Fernwood Road. The study examined the Harbor Drive/Crandon Boulevard intersection and recommended a redesign that was completed in 2005. The Plan recommended widening Crandon Boulevard to accommodate 4ft wide bicycle lanes on both sides. The Plan recommended increasing the Village's tree canopy, especially along Crandon Boulevard to encourage pedestrian activity. The plan recommended changes to the signal timing system on Crandon Boulevard to ease congestion.

### VILLAGE OF KEY BISCAYNE 2020 VISION PLAN | 2006 WRT

The 2020 Vision Plan was conducted in close collaboration with the Village's 2007 EAR, but was intended to be the Village's "sounding board" for future planning and policy making decisions, promoting the community's collective values and aspirations. The Vision Plan recommended a tram/shuttle to provide connectivity among Village destinations, and a water taxi to provide non-automobile access to employment, shopping and entertainment in Coconut Grove, downtown Miami, and Miami Beach. The plan also has specific recommendations for new sidewalks and intersection improvements to encourage pedestrian activity. One important piece of the Vision Statements was "Encourage redevelopment of outdated commercial areas to preserve and expand local-serving retail and professional businesses and services in well-designed, accessible and interconnected centers."

### VILLAGE OF KEY BISCAYNE MASTER PLAN EAR | 2007 WRT

The 2007 EAR was developed in conjunction with the 2020 Vision Plan. The EAR included an update to the comprehensive plan calling for access points at the rear of Crandon Boulevard commercial centers from Fernwood Road for golf carts, bicycle, and pedestrians. The EAR also called for a change in the land use and zoning map to limit commercial and office development to Crandon Boulevard and Harbor Drive between Crandon Boulevard





and Fernwood Road.

**VILLAGE OF KEY BISCAYNE LANDSCAPE  
MANAGEMENT PLAN | 2007 WRT**

The landscape master plan was “designed to establish a Village environment that can be successfully managed as a visually pleasing and environmentally sound landscape with a moderate-to-high level of maintenance needs.” The Plan suggested affording safe, convenient and universal mobility for pedestrians and cyclists while complying with federal, state and local requirements regarding handicap accessibility.

**VILLAGE OF KEY BISCAYNE MASTER PLAN  
AMENDED | 2008**

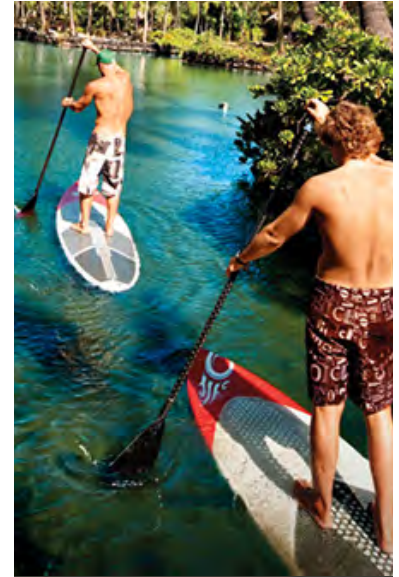
The Key Biscayne Master Plan was amended in 2008, however this amended Master Plan did not include recommended updates from the 2007 EAR. This Plan recognized many of the challenges related to bicycles and pedestrians. The plan recommended reassessing the addition of bike lanes if the number of cyclists “begin to adversely impact the Crandon Boulevard Level of Service.”

**VILLAGE OF KEY BISCAYNE RECREATION AND  
OPEN SPACE RECOMMENDATIONS | 2009 IBI**

This study examined Key Biscayne’s current and future parks and open space needs. The report offered a specific recommendation for a Civic Center Park on the 520 Crandon Boulevard Site, adjacent to the Village Center at the intersection of Crandon Boulevard and McIntyre Street and a series of other recommendations to address the needs of Key Biscayne residents. One of the recommendations involved an interlocal agreement allowing the Village to develop ball fields on Virginia Key, obviously requiring non-pedestrian transportation options for Village residents.

**GOLF CART / PEDESTRIAN / BICYCLE FERNWOOD  
ROAD AND COMMERCIAL PROPERTY SAFETY AND  
ACCESS PLAN | 2009 C3TS**

This golf cart study resulted in a golf cart ordinance and a plan for improving access to key locations along Crandon Boulevard from Fernwood Road for golf carts, bicycles, and pedestrians. It also recommended amending the zoning code to require 3 golf cart spaces per 50 vehicular parking spaces.



### MIAMI BICYCLE MASTER PLAN | 2009 HNTB

This plan serves as Miami's guidebook for improving its bicycle infrastructure. The plan's study area did not include Key Biscayne, however it did reference the importance of Rickenbacker Causeway and its bike lanes in the city's bicycle network.

### 2040 LRTP | 2014

The Miami-Dade MPO's Long Range Transportation does not include any projects for Key Biscayne.

### VIRGINIA KEY MASTER PLAN | 2010

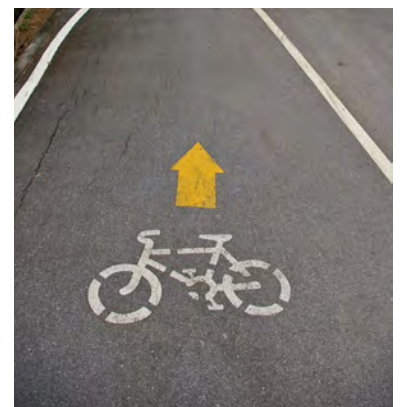
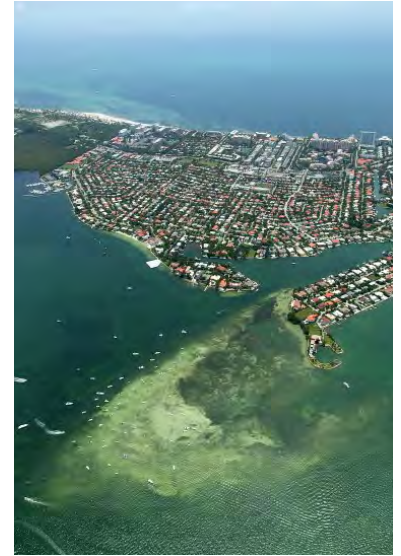
The Virginia Key Master Plan hoped to revitalize Virginia Key as a recreation destination. Several recommendations for improved and new recreation facilities were in the plan and included a recommendation for additional ball fields, similar to the recommendation in the Key Biscayne Recreation and Open Space study. The Plan also included a recommendation for water transit service to the island that would also serve Key Biscayne, Coconut Grove, and Downtown Miami.

### VILLAGE OF KEY BISCAYNE EAR | 2012

This document is an update to the Goals, Objectives, and Policies section of the Village Comprehensive Master Plan. The updates included in this document are based on the 2007 EAR. This update to the Master Plan included amendments related to mixed-use development, affordable housing, and bike/ped facilities that if followed would improve mobility.

### TRAFFIC CALMING MASTER PLAN | 2012 C3TS

This plan included a comprehensive analysis of identified streets that did not have any traffic calming measures and provided recommendations for various safety and traffic calming improvements. Additionally, the Plan offered traffic calming policy guidelines for the Village. The report included recommendations for several traffic tables, a few lane width reductions, and a few intersection modifications.





### **MIAMI-DADE TRANSIT DEVELOPMENT PLAN | 2013**

This Transit Development Plan presented the operational and capital improvement needs of Miami-Dade Transit (MDT) and served as the planning tool to project future MDT needs for implementation and operation for 10 years. The plan included a recommendation to improve headways to eight (8) minutes during peak periods for Route 102 B serving Key Biscayne.

### **KEY BISCAYNE SUSTAINABILITY PLAN | 2014**

The Sustainability Plan was intended to help the Village of Key Biscayne develop and implement policies and initiatives consistent with responsible stewardship of Key Biscayne's environment and infrastructure. The Plan includes a series of short- and long-term goals with the purpose of helping the community live responsibly and sustainably, protecting the health, well-being, and viability of the community for present and future generations. The Plan included a few recommendations related to transportation options. One for encouraging electric vehicle charging stations in multi-family buildings and one encouraging the Village to invest in electric golf carts for Village use.

### **PLAN Z | 2015 ZYSCOVICH**

Plan Z is proposed plan by a local architect and cycling advocate group concerned about bicycle safety on the Rickenbacker Causeway. The Plan calls for lowering the functional classification for the Causeway to minor arterial, reducing it to a consistent two travel lanes in each direction, with protected bike lanes, and designating the entire Causeway a park. The plan approaches development from a park system standpoint.



► Source: Plan Z



## IV. Issue Diagnostic and Needs Assessment

**Key Biscayne's transportation issues, while diverse as described by residents and data, fall into 2 distinct categories, internal and external, with specific considerations within each of these two broader categories, ranging from congestion to safety. While inherently connected and having a compounded effect on the entrance to the Village, where most of Village's congestion is observed, each set of problems are distinct and may need to be addressed separately.**

### ISSUES OF EXTERNAL CONNECTIVITY AND MOBILITY

For the purposes of this study, external connectivity for Key Biscayne consists of Crandon Boulevard from the entrance to the Village to the Toll Booth area for the Rickenbacker Causeway. Transit Connectivity at this point allows for further connections to the MetroRail's various destinations.

#### **Congestion**

Congestion on the Rickenbacker Causeway, which normally operates at a LOS C, occurs primarily during the hours of 8 -9 AM in the morning, and 5:30-6:30 PM. Specifically, congestion on the Rickenbacker is related to three major considerations of mobility for the residents of Key Biscayne: Mobility during special events, quality of life/time loss due to congestion, and emergency services access. Of these three issues, emergency services access is the more severe given the effects during times of threats to life or property.

#### **Average Mobility Issues**

On average, Key Biscayne residents should experience relatively few traffic delays along the Rickenbacker Causeway, based on peak hour peak time analyses of the roadway linkages.



However, the special nature of the ingress/egress of the community means that it also affected by planned checkpoints, such as lane closures or sobriety checkpoints. These checkpoints, if placed at certain junctures, produce high and potentially disproportionate impact on Key Biscayne residents. When these checkpoints are set during rush hour, the roadways become constrained, and the LOS degrades from C to F on some portions of the Causeway during these instances.

### MOBILITY DURING SPECIAL EVENTS

Mobility issues during Special Events occur periodically throughout the year. These events occur between the mainland and the Village of Key Biscayne, and can be either high profile or high attendance events, such as the Miami Tennis Open. The influx of additional traffic during these events results in less roadway capacity on the Rickenbacker Causeway, pushing the LOS from C to E or F, depending on the section of the roadway. This level of impact reduces the mobility of the residents and is a major cause for concern. Some of this traffic does reach the Village of Key Biscayne, as seen by traffic counts taken when the events were in session versus when they were not. During these events, traffic rises by upwards of over 4000 vehicles entering the Village daily, raising overall Village traffic by 13%. At the entrance to the Village at Crandon Boulevard, this additional traffic reduces the LOS from E to F.

Recently, the Village encountered the issue of moving additional events to Virginia Key. One core issue for the Village is that it has little control over the use of Virginia Key's facilities as they are outside of Key Biscayne's jurisdiction, but must absorb the externality effect of these events.

### Emergency Services Access

One of the most concerning issues regarding congestion is the lack of alternatives to bring someone to a local emergency room. Key Biscayne has no emergency care centers on the Island; thus, in emergency situations, there is a primary reliance on the Rickenbacker Causeway route. This has two implications: first, potential



delays may result during life-threatening situations, and second, additional return times after the patient has been delivered to the emergency care centers negatively impacts emergency services staffing, and reduces overall service flexibility and responsiveness time. At a minimum, a maximum 15 minute threshold should be maintained for emergency services, but this ability is threatened at levels of delays with LOS F. In addition, this problem is further exacerbated by the level of traffic generated by special events.

## Bicycle Infrastructure and Safety

Bicycles are easily accessible on the island of Key Biscayne. At least three locations on the island provide some form of bicycle rentals, and residents, even of higher density and mixed-residence developments, such as the Ritz-Carlton, store their bicycles on-site. However, bicycle racks tend to full at commercial and other locations such as the school, and visual observation at multiple times through the year indicate a persistent deficit in bicycle parking facilities.

Bicycling safety on the Rickenbacker is affected by both motorist and bicyclist behavior; thus enforcement and education must be implemented in tandem with any necessary infrastructural improvements. Ridership along the Rickenbacker is diverse, ranging from tourists to local population.

Bicycling along the Rickenbacker noticeably takes form with regular riders, and group riders who organize into pelotons. Currently, Miami-Dade County is beginning to launch a new program, with colored striping and increased emphasis on the separation of traffic, with implementation in Fall 2015. Review of data resulting from this pilot initiative should be reviewed; ultimately, a decision should be made regarding whether physical barriers should be installed between the bicycle lanes and the roadway.

## Transit

Transit service runs on an approximately 15 minute peak hour timetable, with service slowing to occur once an hour during



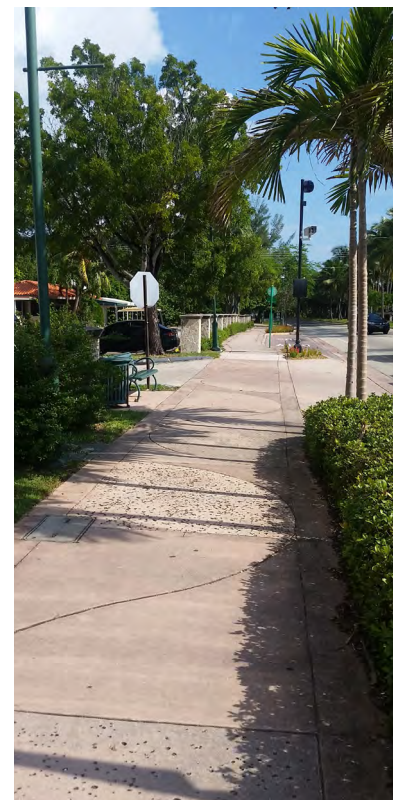
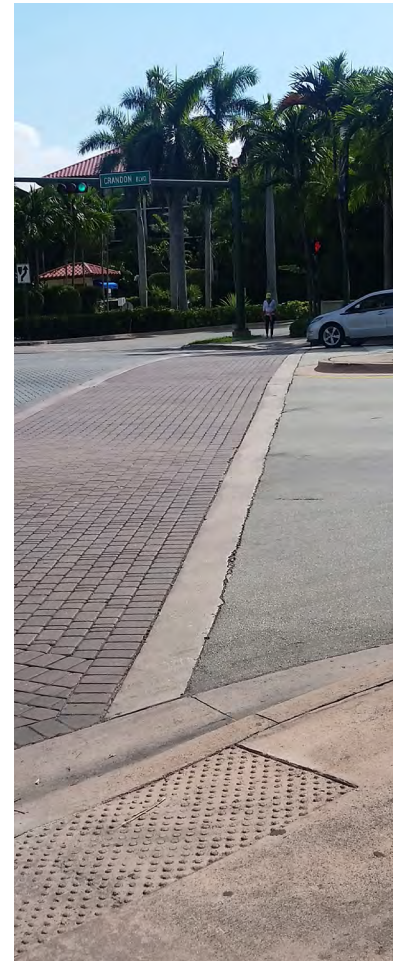


the course of the day. Route B, the route servicing Key Biscayne, serves as the Village's link to the MetroRail. This route leaves the Brickell Metrorail Station and travels south to either Cape Florida State Park or Mashta Drive in Key Biscayne. Peak season generally runs January-May for ridership, with ridership peaking in March. Ridership range runs anywhere from 45,000-61,000 riders each month. It is important to note that during construction of Rickenbacker Bridge, which closed two lanes, ridership held steady from the prior year for much of the year. This consistency in ridership indicates that transit users utilize the bus because of need. These are not choice riders.

The current ridership numbers indicate potentially an influx of domestic help or construction workers during the day as the primary ridership of the system. At the same time, this is noteworthy because the trip generation model indicates that there is significant trip generation between Key Biscayne and Downtown Miami and the Coconut Grove and surrounding areas. The question then becomes, "Why are others not taking transit? Is there a demand for it or is it a matter of constrained convenience?" In addition, it is likely the answer for off-island services is a different answer for on-island services, though a shuttle should be explored for the MAST Academy as well for local students, to reduce any additional trips created from school traffic.

### **Pedestrian**

Pedestrian connectivity is good along the Rickenbacker Causeway; however, the system could benefit from better lighting, which in turn will benefit bicycling safety as well. Existing lighting is geared towards vehicular traffic. From a connectivity standpoint, however, the pedestrian network is sufficient for its current and potential future users – the distance between the mainland and the Village of Key Biscayne indicates that the route is more likely to attract recreational users, with parks or the actual walk being the destination. A main issue, however, is the consideration of continued modal separation from bicycling in the form of differentiated systems as opposed to a shared-use



pathway. Crossings are also an issue at specific points along the route, such as at the Tennis Center, given perceptions of speed and the effect of pedestrians on vehicular traffic flow-through when vehicles have to stop for pedestrians.

### INTERNAL CONNECTIVITY

From the viewpoint of accessibility and mobility, Key Biscayne residents generally have high mobility, with an overwhelming reliance on vehicular transit. Accessibility to goods and services are also high from a vehicular standpoint. Accessibility from a bicycling and pedestrian standpoint, however, has traditionally been lacking, with systemic gaps in the infrastructure. At the same time, vehicular mobility, while traditionally high, has been eroded over time by the impact of increased residential development and demographic shifts.

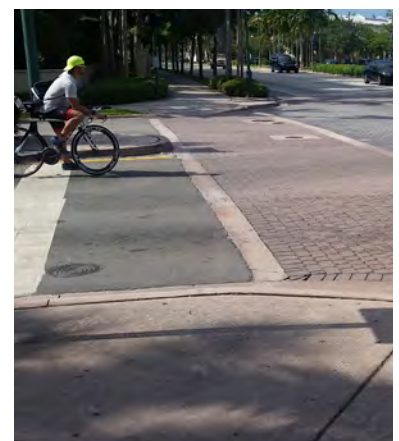
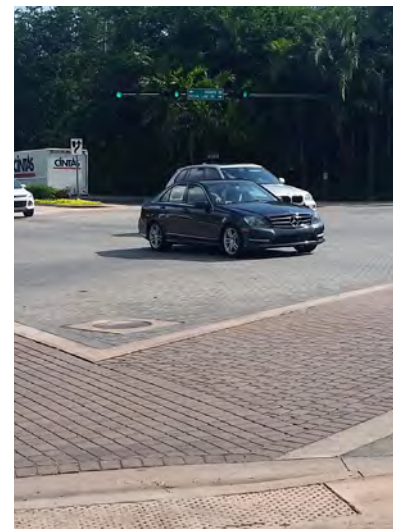
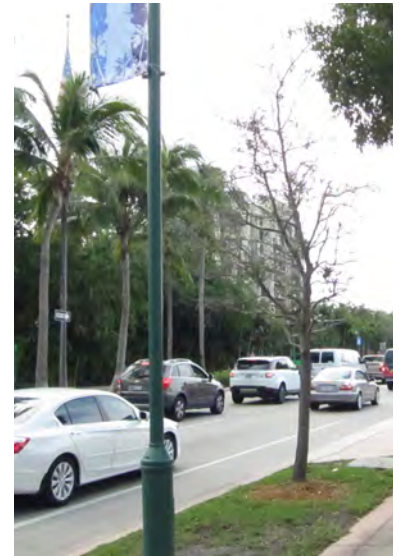
### Congestion

Each day, the community of Key Biscayne generates upwards of close to 8000 trips. These trips generally circulate around the community; that is, Key Biscayne residents are responsible for a significant portion of trips internally circulating within Key Biscayne.

The perception of internal circulation issues drives concern over the worsening congestion. Overall, the congestion is not necessarily severe in Key Biscayne. Most of the roads operate at a LOS C, with some at D, during both AM and PM peak hours. Signalization at intersections, which will be discussed in a later section, seems to be the driving factor of driver frustration.

Unsurprisingly, the intersection of Harbor Drive and Crandon Boulevard fails to meet standards both in the morning and in the evening.

Future congestion is expected to become worse even in the absence of actual population growth. This is due to the high proportion of children within the community as compared to other areas. As these children become teenagers, they may begin to drive; while general national and regional trends indicates that these children, under current conditions, will drive by necessity





due to the current levels of multi-modal transportation infrastructure. Without additional investment to allow for a modal shift, additional traffic will accrue with an overwhelming effect on vehicular usage.

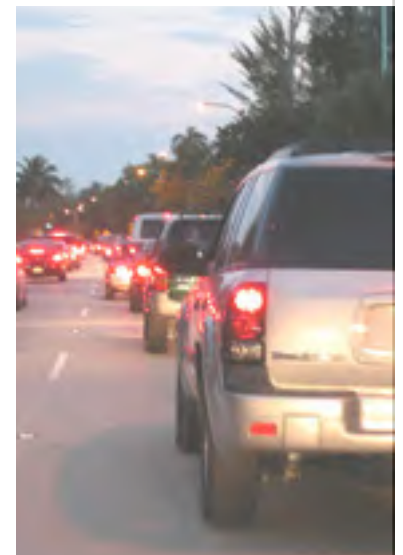
### **INTERSECTION LOS AND LIGHT SIGNALIZATION**

Issues of traffic flow along Crandon Boulevard are exacerbated by the current signalization of key intersections with high levels of ingress and egress, such as Key Colony and at Crandon Boulevard and Harbor Drive. These signalization issues are noted by the community as well, and while normally traffic would adjust around these intersections, the roadway network does not allow this option. The natural “chokepoint” tendencies of these intersections result from a lack of additional alternative routes. Currently, all signalization programs are controlled by the Miami-Dade County Public Works Department, and the Village must work with the County is altering the signalization. The Village is currently pursuing smart signalization as a means to relieve circulation and congestion issues.

Delays at intersections are a concern. Roadway level of service indicates that the congestion issue is not severe from a linkage standpoint. However, intersection Level of Service may indicate traffic issues, and is independent of Roadway Level of Service. 3 specific intersections were evaluated based on citizen and Council concerns regarding congestion and in relation to observed Roadway Level of Service. To begin, the evaluated intersections LOS below were:

1. Harbor Drive and Crandon Boulevard: LOS F
2. Harbor Drive and Fernwood Road: LOS C
3. W. McIntyre Street and Crandon Boulevard: LOS C

What these intersections tell us is that the traditional modeling for intersections is not providing the entire picture. Certainly, local knowledge and the analysis both align to indicate that the intersection of Harbor Drive and Crandon Boulevard has a failing LOS. However, other intersections register at an acceptable level of service C. Yet, during the field review, multiple light cycles, including pedestrian crossing signals, would occur at several intersections before the traffic signals allow a driver to turn. This would occur when there was no oncoming traffic, resulting in a situation which is frustrating for many drivers, and a condition which can be ameliorated through appropriate signal timing. With other intersections, the same situation is reported by residents, so that a signal progression issue is inherent by local knowledge and which has been verified by multiple field visits. This is not necessarily inherent by solely looking at intersection



EXISTING CONDITIONS										
AM Peak Period (7:45 AM to 8:45 AM)										
MOEs	EBL	EBT	EBR	VBLT	VBR	NBL	NBTR	SBL	SBTR	INT.
Delay (s/veh)	139	142	7	94	7	21	20	11	26	45
LOS	F	F	A	F	A	C	C	B	C	D
w/c	1.13	1.14	0.29	0.96	0.29	0.56	0.51	0.24	0.73	
95% Queue (ft)	340	190	30	298	20	64	300	39	422	
95% Queue (veh)	17	10	2	15	1	3	15	2	21	
PM Peak Period (4:15 PM to 5:15 PM)										
MOEs	EBL	EBT	EBR	VBLT	VBR	NBL	NBT	SBL	SBT	INT.
Delay (s/veh)	73	74	8	60	8	12	20	12	18	26
LOS	E	E	A	E	A	B	B	B	B	C
w/c	0.84	0.85	0.36	0.69	0.25	0.37	0.56	0.38	0.54	
95% Queue (ft)	224	234	6	115	18	57	380	48	36	
95% Queue (veh)	11	12	0	6	1	3	19	2	2	

Note: Queue lengths shown in bold may extend longer at times.

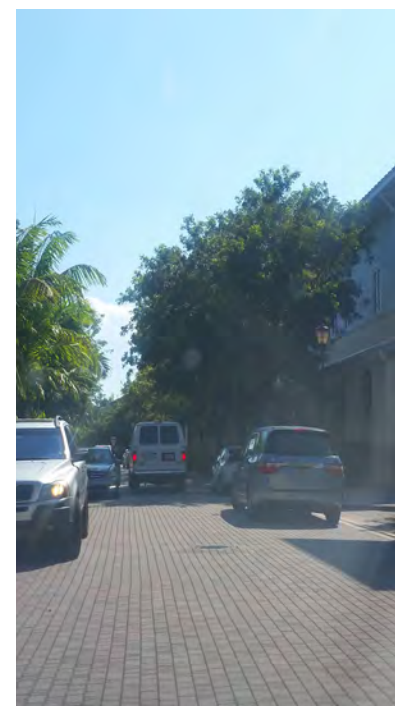
numbers taken at one point in time.

For some of these intersections, however, such as Key Colony Drive, while signal optimization may ameliorate some of the conditions, the inherent problem is that for this community, there is a “chokepoint” situation exacerbated by a changing population. This volumetric problem creates a strain on the one-way in, one-way out gated community’s ability to leave their homes in a timely manner, and for which signal optimization may only be one component of the overall solution.

Further, signalization issues pose problems for emergency service vehicles, which may be mired in traffic with limited leeway in maneuverable space on the vehicular right of way. Technology allowing for these vehicles to alter signalization patterns should be explored to allow for triggered changes in signalization during emergencies.

## CONNECTIVITY

Key Biscayne, internally, is overall a highly connected community from a vehicular standpoint. The roadway network is a mixture of a grid system with two major spines, and with a parallel, minor spine along Woodcrest Road as a relief path for Crandon Boulevard. Along Crandon Boulevard, there are several gated developments. At high stress levels for the roadway network, access to these specific developments are constrained by the lack of additional alternate egresses. As noted from the issue of the light signalization, these chokepoints may benefit from





better signalization. However, alternatively, the underlying issue is one of accessibility, and thus additional connections.

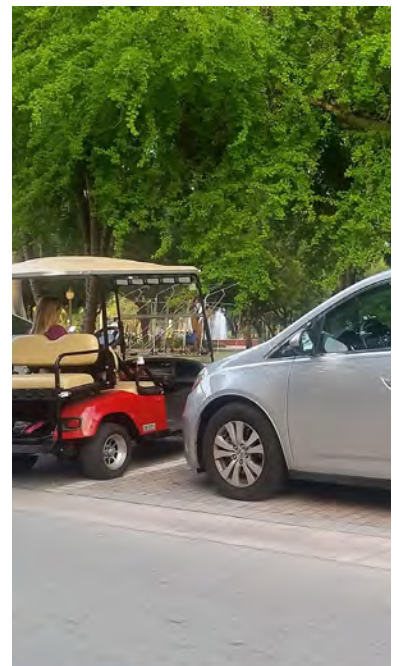
Multi-modal connectivity to commercial areas are also primarily car based and limited. The commercial areas of Key Biscayne are located along Crandon Boulevard with residents as the primary consumers and some additional shopping tourists en route to Bill Baggs State Park.

The pedestrian network for Key Biscayne, however, is one with low levels of connectivity to residential areas, as the system is riddled with gaps in the sidewalk system. Of concern are the lack of sidewalks to the Key Biscayne K-8 Center. The lack of grade separation throughout the Village is the result of history and opposition. While sidewalks are built on the right-of-way, owners generally perceive the grassy areas, despite their status as Village easements, as an unalienable part of their property. Opposition also results because of Key Biscayne's lack of parking for visitors. These visitors, based on field reviews, tend to park on the swale; this would be not be possible if sidewalks were in place. The need for grade separation along roads in Key Biscayne is a matter of safety, due to the speeding on local roads. New sidewalks enjoy support among parents, who want a safe walking environment for their children.

### PARKING

An evaluation of the Institute of Transportation Engineers Parking Generation Manual was performed. For each use in the area, the parking generation number was provided and it was determined that 416 spaces were needed. The Village has 292 spaces in the area, leaving a deficit of 124 spaces.

In undertaking the analysis a distinction of usable public versus reserved spaces was done. Due to the mixing of reserved parking and public parking, the available non-employee parking (on and off street) for these facilities equals 210 (total spaces minus 82 spaces for staff).



While the Village has, approximately 131 on-street parking spaces and 161 off street spaces, (292 total) it should be noted that of these off street spaces, 62 are essentially reserved and/or controlled spaces, and should not be considered as part of the overall available parking for visitors from an analysis perspective. Staff parking is accommodated within these 62 spaces, which is insufficient for staff. Based on employment numbers the Village has a need for 92 staff spaces, for a deficit of 30 spaces. Additionally, the Community Center also employs contractors for various recreational activities. These contractors are highly likely to drive, and amount to approximately 10 equivalent auxiliary employees.

Parking was observed on multiple occasions during the peak hours. Actual occupancy resulting from usage of reserved spaces, park usage, overflow from commercial areas and visitors to residential units account for some of the on street parking demand as some of the spaces are restricted spaces. ), It has been conservatively estimated that the peak adjusted parking demand for these spaces is 295 spaces, resulting in a deficit of 85 spaces. Combined with the employee parking deficit of 20 spaces, the total space deficit including staff, is 105 parking spaces.

The study area acts as one area-wide shared parking system. A review of actual operations in the field indicates that in the study area people having business at Village Hall, the Community

Facility/Area	Off-Street Spaces	On-Street Spaces
Village Green	0	78 (69 regular spaces, 7 golf cart & 2 handicap spaces)
Village Hall	47	12 (11 regular spaces & 1 handicap space)
Fire Station	15 double spaces	1 15-min space
Community Center	84	24
530 Crandon Boulevard Park Area	0	0 (shared with Community Center, Village Green, Village Hall)
On-Street East Enid	0	78
On-Street West Enid	0	11

Center, and the park, drive around and search for spaces closest to their destination. This accounts for the observation that the underground parking at the Community Center is regularly full.

Observed behavior includes crossing from the Community Center parking structure to reach Village Hall during government business hours. This, combined with the consistent counts

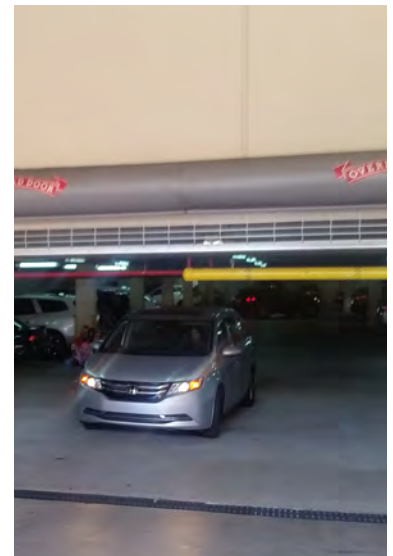


for parking with parking immediately adjacent to the Village Hall, supports the indication of a Village Hall parking deficit. In addition, during the parking study, during peak times of activity, double parking could be observed along the park at Crandon Boulevard, and also resulted in 7 standing cars on Village Green Way at a loading/pick-up only zone, indicating an overflow effect onto the Community Center and Village Green’s parking supply.

The fire department was the only facility that had a parking demand that was continually at the facility’s regular parking capacity. This is attributable to the fire department’s low visitor rate compared to other facilities, and the tandem parking, which, though inconvenient, allows for the department’s staff to fully park within the facility. However, the building also houses the Council Chambers. While not a regular use, this parking can and needs to be accounted for via usage of other available space in a shared parking system.

From the field review, several locations outside of a 0.25 mile walking radius (see map for radius) were selected to evaluate potential parking overflow issues, since on-street parking is shared and can have a cascading effect. For this purpose, Mashta Drive and East Enid Drive were counted. From the counts, it has been concluded that Mashta Drive does not have overflow from the north, but also does not have overflow from the south, so it does not have an effect on parking on Westwood Drive, and by consequence, W Enid Drive. Further, this lack of effect on Westwood Drive, combined with the parking counts on West Wood Drive, strongly indicates the possibility that the extent of a “willingness to walk” ends at West Enid Drive for the park and recreation sites, especially given West Enid Drive’s counts.

For East Enid Drive, south of West Enid Drive, overall parking can accommodate approximately 78 vehicles. However, this is for the extent of the street, whereas the 0.25 mile walking distance ends midway on the street (see map), allowing for 45 spaces. For most of the counts, we find that the parking is either tilted towards the eastern end, outside the 0.25 mile walking area for



the civic center area, or evenly distributed along the street. This would tend to indicate highly localized parking related to the residences in the area. Based on the data, it is unlikely that we would find a substantiated effect from this parking area that would relieve parking pressures from the demand generated by the sites in question. In fact, demonstrated field behavior indicates that most drivers will not walk more than 0.10 to 0.15 miles to their destination (approximately two small blocks). Thus, the inclusion of these 45 parking spots located within the 0.25 mile radius is not supported by field counts, and is thus excluded from the pool of available parking. This desire not to walk is the genesis of the congestion problems on the Island.

Observed behavior during the counts also indicated that people will park in the space closest to their need; however, this becomes an issue when golf carts are involved, as the golf carts have taken spaces which could be utilized by vehicles, while golf spaces were empty in some cases. Golf carts also seem to try for the Civic Center underground parking structure when possible. This observed behavior artificially reduced the parking counts noted in the charts, but not the actual observable parking demand, as cars were noticeably circling for parking, or on Fernwood Road with blinkers. In other cases, double parking occurs, as demonstrated in the Community Center parking structure. Thus, while it looks like the Village is meeting demand because there are some empty spaces, actual parking demand is slightly higher than observed in the counts as a result. For delineated parking facilities with marked stalls, field counts also noted a number of incorrect parking such as double parking or occupying two spaces with one vehicle. When this parking occurs, it eliminates available space, and thus has an effect on the parking supply availability as well.

### Safety





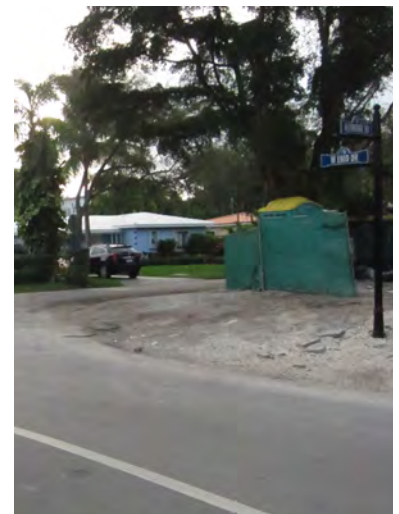
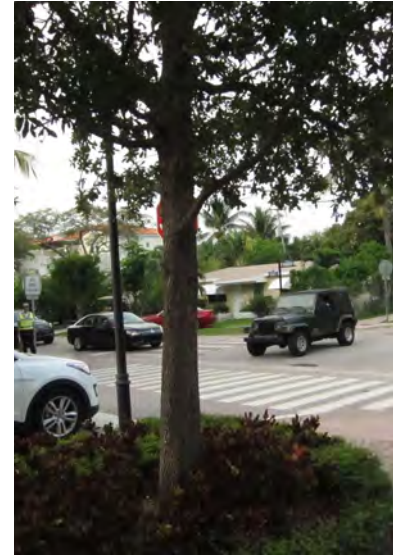
Several issues of safety were noted during the Village's recent Safe Routes to School Study, and continue to exist based on field observations and resident concerns acquired during the public engagement process. These issues include distracted driving at intersections, speeding in the neighborhood, and other issues requiring traffic law enforcement.

Crash data for this study was collected for the years 2010 through 2015. Within the study area, 803 crashes occurred in the five year period, with 426 accidents occurring within the hours of 7:00 to 14:59 (7 AM to 2:59 PM). Overall, in the five year analysis period there have been 145 injuries and 1 fatality due to crashes in the area. Of these accidents, 39 involved injuries to bicyclists, and 5 involved injuries to pedestrians. Crashes involving bicyclists and pedestrians tend to be higher profile, and have a disproportionate impact on perceptions of bicycling and pedestrian safety.

For pedestrians, the lack of sidewalks as a form of grade separation from vehicular and other traffic creates the sense that some roadways are not safe to walk on; roadways with speeding discourages pedestrians – this is then reflected in short drives in the Village, sometimes to a place of recreation and exercise (park, community center). Some of these roadways are on direct paths to Key Biscayne K-8 Center, and should be quickly addressed. The Village recently completed a Safe Routes to School Study, which enabled it to receive approximately \$ 837,000 in grant money for improvements.

ADA compliant infrastructure is generally good along Crandon Boulevard. Corner ramps have detectable warning incorporated into their design. Further improvements could be effected through the installation of voice systems with audible countdowns. As additional infrastructure is provided around the Village, however, the usage of ADA compliant design should be encouraged and incorporated into future transportation plans.

Golf Carts safety issues also exist - golf cart drivers exhibit, based on field observations, the same patterns of behavior as car drivers, with texting while driving, a need to better check



for bicyclists and pedestrians before proceeding, and in some cases needing to wear their seat belts.

### Lighting

The Village is currently in the process of implementing new lighting along some its roadways. However, lighting is an issue across the Village, and deters bicycling and walking in the evenings. As a residential community, Key Biscayne has observed physical activity in the evenings; particularly, this can be seen in the Village Green area, with soccer games at night.

The lack of appropriate lighting through the Village also results in a higher rate of vehicular use during these times. At the same time, most of the participants for these activities would at most walk 15 minutes to reach their event.

There are concerns about lighting at night for bicycling as well. A perception among citizens is the notion that the more severe bicycling accidents occur at night.

### Transit

MDT route B services Key Biscayne; ridership peaks around March of each year (approximately 65,000 riders in March 2015). Bus shelters are generally shaded and well maintained. Generally, people board and alight at the stops on Crandon Boulevard north of Harbor Drive, by Key Colony Drive, at Village Green Park, Westwood Drive by Winn-Dixie, and Bill Baggs State Park, with boardings and alightings highest at Crandon Boulevard and Harbor Drive. From a ¼ mile walking distance standpoint, transit coverage is 63.4% of the Village's area, reaching 73.5% of all properties.

However, this coverage area includes the spur section of Route B, which does not always run. Regular full service results in a service coverage area that is less than half of aforementioned numbers, reaching 26% of the properties on Key Biscayne. Thus,





transit access is low within the Village of Key Biscayne.

Transit development is dependent on providing not only access, but timely and appropriate access. For Key Biscayne, this is not achieved on either level for residents. While transit service does exist for Key Biscayne, the nature of the route, as well as the timing of the Miami-Dade Transit routes, combine to provide relatively low ridership. Thus, for most of Key Biscayne's residents, the options are either to drive or plan around the schedule for Route B, which is infrequent and constrained. While they can walk further to reach Crandon Boulevard, this option is hampered by the additional distance as well as the lack of sidewalk connections. This lack of options is particularly evident for the elderly population, who may not be able to walk longer distances. Within the island, there are calls for the development of an internal circulator system from the Chamber of Commerce and private citizens. The development of internal alternative mode transit can come in varied forms, ranging from trolleys to on demand services, as well as tram shuttles.

### **Bicycle Infrastructure and Safety**

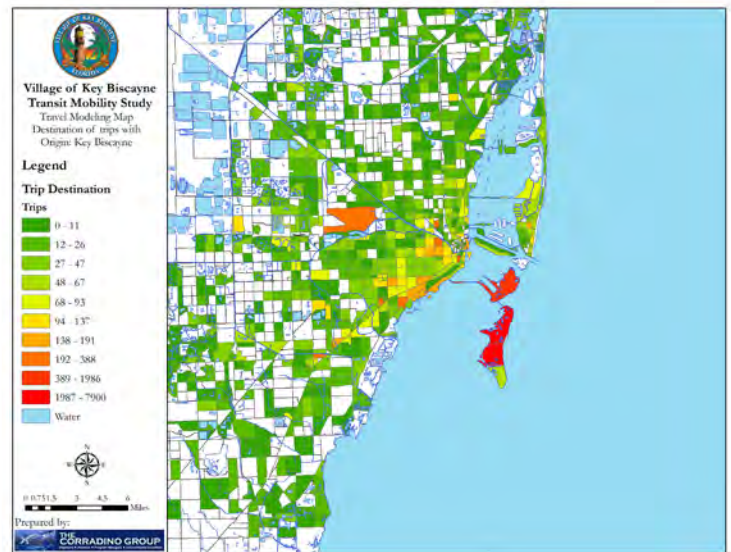
Bicycles are easily accessible on the Village of Key Biscayne. At least three locations provide some form of bicycle rentals. Higher density and mixed-residence developments, such as the Ritz-Carlton, store their bicycles on-site. However, bicycle racks tend to be full at commercial and other locations such as the Key Biscayne K-8 Center, and visual observation at multiple times through the year indicate a persistent deficit in bicycle parking facilities. Bicycles at the school can be found overflowing from the bicycle parking area, resulting in sidewalks which have been blocked by fallen bicycles, and utilization of fences as hitching posts. The Village does not have bikeshare stations that are available in other parts of Miami-Dade County.

Bikesharing is not likely to be of high value to Key Biscayne, with one exception – connectivity to existing stations in Miami. In this regard, a bicycle trip to Bill Baggs State Park would result in one less vehicle on the roadway; however, the effect of incorporating bikeshare for this is not high. Elsewise, internal to Key Biscayne,



are bicycle rentals which provide an existing, on-going service within the Village.

Bicycle lanes in Key Biscayne exist on Crandon Boulevard, and are not separated from vehicular traffic. There are concerns about lighting at night for bicycling as well. For many cyclists, particularly children who use this as a mode of travel to school, a north-south pathway is not the main concern, especially if it is along Crandon, which has bicycle lanes. Rather, parents are more concerned about the effects of speeding in the local neighborhoods, and the crossing of Crandon Boulevard, especially when heading in an east-west direction to and from the Key Biscayne K-8 School.



Because the Key Biscayne grid ultimately resembles a modified square, with a partial circle, there are similarities to a spine road system that intersects a ring road. In this comparison, we realize that from an infrastructural standpoint, Key Biscayne's bicycle network suffers from the flaws seen in similar systems elsewhere. While Harbor Drive, a vital road, provides an alternative route around the community and a longer route for a leisure ride, the lack of solid east-west connectivity, with minimalized speeding, within the island's network hinders effective traveling for local bicyclists seeking to reach the commercial areas of the Village in a direct manner. This same issue also applies to the recreational center and the K-8 Center.

However, because most of the island is "porous," in that one can ride through areas like the Village Green, and because of Crandon Boulevard's equidistant location relative to the rest of the island, it can serve as an effective spine for the bicycle network as well enhancements to east-west routes allowing for direct travel paths. Future enhancements to this system can then be effected through the inclusion of alternate routes made viable through safety improvements, . Viability is the key here; from a mobility standpoint, if bicycles share the road, then it is not to say that these routes do not already exist; rather, why would one utilize them when bicycle racks at the destination are consistently full/overflowing, and where safety issues on the streets is a concern? Modal shift, then, does not happen without addressing key concerns that create issues for the utilization of that



particular mode of travel. For bicyclists, safety and perception thereof is key.

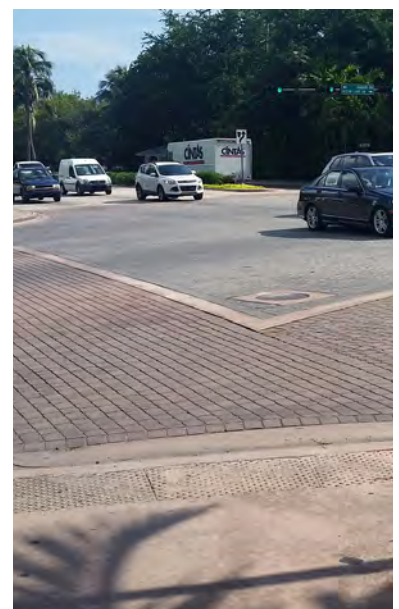
### External Travel, Where Are People Going

It is crucial to distinguish between internal and external travel, as they both present unique and often mutually exclusive problems. Both types of travel are complex and may rely on vastly different solutions. While examining external travel, it is known that people are going from Key Biscayne to relatively few areas of the County, including the Airport, Downtown Miami, Coconut Grove, South Miami and Dadeland. These are all areas connected by high capacity transit like Metrorail. Yet to get to and from those destinations, they must use the Rickenbacker Causeway. Local perception is that this causeway is always congested. However, analysis shows that the Causeway during non-event days operates at a level of service (LOS) “C” indicating acceptable traffic flow with relatively minor delays if they occur. Conversely, when events occur, like a tennis tournament, etc., the Causeway operates at a level of service “F” indicating heavy congestion and congestion delays. The issue is that there are so many event days that untenable congestion is a frequently regular occurrence.

### Internal Travel

Internal travel is focused on the bottlenecks at intersections, particularly at Crandon Blvd and Harbor Drive. However, parking, walking, biking, transit and golfcarts also play a component at other intersections where the cross interaction between the various modes raises questions of safety and points of intermodality within the Village. Signal timing adjustments, either through a signal progression analysis or adaptive signalization is necessary to resolve these issues.

Internally, it is shown that the primary bottleneck is at the intersection of Crandon Boulevard and Harbor Drive. The



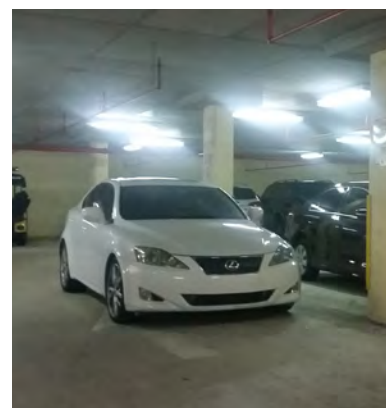
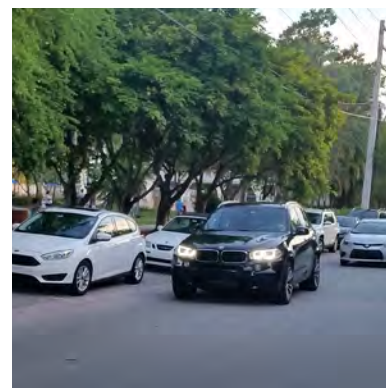
primary issue impacting traffic flow and congestion occurs at the Crandon Boulevard intersections, where intersection congestion, not roadway capacity, influences traffic. While it is not inherently recognizable through technical analysis, signal timing issues are at fault. It has been observed that drivers would regularly have to wait at red lights for up to 3 minutes with relatively little cross traffic. This leads to high levels of frustration.

Congestion in much of the Village is exacerbated by people searching for parking. A study conducted during this process shows that in the Village center area there is a parking deficit of up to 124 spaces. To mitigate this there have been discussions regarding the construction of a parking garage. It was discovered during the analysis that the heavy reliance on automobiles creates additional issues relative to parking. People like to get as close as possible to their destination before parking. They have been observed by-passing open parking spaces to get a block closer. People will double park on the roadways instead of parking to run quick errands. Adequate parking must be provided to meet local needs in order to reduce congestion and increase accessibility.

Likewise, people in Key Biscayne will drive to otherwise walkable short distances to go to and from school, the parks and the shopping areas. It is believed that this is done because there is a perceived lack of adequate and safe pedestrian ways, and there are safety issues when crossing Crandon Boulevard.

The previous Safe Routes to School Study have sought to remedy much of these issues. That study won a grant in excess of \$800,000 to build adequate pedestrian ways and bicycle infrastructure.

Yet the parking deficiency and congestion have begun to change behavior. This can be evidenced by the fact that people are cycling. Bike racks at the shopping areas and schools are regularly filled up. The key to this effort will be to leverage the natural tendencies of certain groups of people to move without a car, by assuring that the multimodal infrastructure is in place





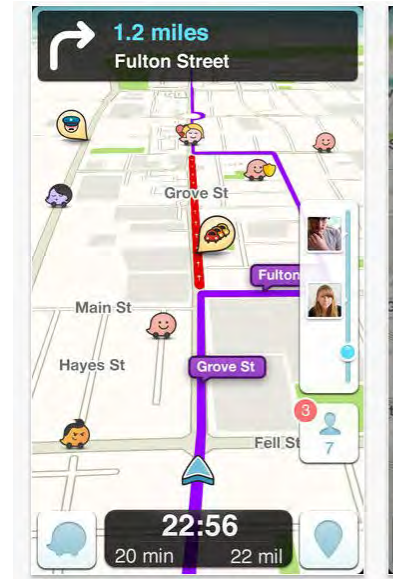
and in excellent condition.

Transit coverage in the community is relatively poor because it only adequately serves the commercial areas surrounding Crandon Boulevard. As a supplement to this, people have taken to using golf carts. In the constricted environment of Key Biscayne these enable more vehicles to use the space, thereby increasing capacity of the roads and parking areas.

A further look into these numbers shows that on days in the peak season, when school is in session and the tennis tournament is not occurring, traffic volumes on the Causeway are at about 41,000 vehicles, equating to a LOS C. When school is in session and there is a tennis match, volumes rise to 59,000 vehicles per day equating to a LOS F. Similarly when there is no school and a tennis match volumes are at 56,000 per day or LOS F. Special events like the Tennis Tournament can increase volumes on the Causeway by 18,000 vehicles per day, a 44% increase from non-event days. Yet these events only increase traffic on Crandon Blvd by about 3,300 vehicles per day. Schools account for nearly 4,000 trips per day. Solving external traffic issues can be undertaken by providing people options as to how to get to the event destination.

### Solutions – The Cultural Shift

A cultural shift to walking, biking or using larger capacity vehicles is critical, if not inevitable in order to maintain mobility on Key Biscayne. Transportation and mobility is predicated on moving people and goods through a system. All systems have capacities, not unlike a water pipe, which is much more well defined in terms of capacity. A certain diameter pipe will carry a certain number of gallons per hour. The roadway network is no different. As the number of vehicles reaches the capacity threshold, the system slows down. The good thing about transportation on Key Biscayne, is that we have not really begun to tap into the capacity of the sidewalks, and bikeways. Further, if multiple people are carried in a vehicle, we can more efficiently use the roadways. Whether this cultural shift away from the single oc-



occupancy automobile happens naturally or is incentivized is a key policy aspect of this project.

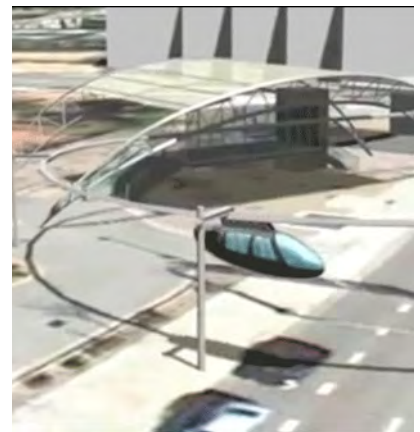
### Solutions for External Congestion

Congestion on the Rickenbacker Causeway, which occurs during special events, increases traffic by up to 44%. And, there are no alternative routes. Two primary ways to mitigate this is to provide alternatives which lower general traffic, allowing for more capacity to absorb part of the special events traffic. Multiple projects have been developed which could be used, including:

- ▶ Dedicated Key Biscayne Lanes
- ▶ Event Traffic Demand Management
- ▶ Park and Ride Facilities
- ▶ Daily Travel Demand Management
- ▶ Minimizing Lane Closures
- ▶ Sobriety checks west of toll gantry
- ▶ Mass Transit
- ▶ Light Rail
- ▶ Bus Rapid Transit
- ▶ Micro Transit
- ▶ Water Taxi
- ▶ Gondola
- ▶ Diversification of Local Services

In general these are larger cost projects that are complex relative to planning, design, permitting, construction and intergovernmental coordination. Implementing them relies on a variety of external parties, since all land north of Harbor Drive is under the jurisdiction of other entities.

The issue is capacity. Perhaps the most logical recommendation would be to suggest a dedicated lane for Key Biscayne drivers, which would enable them to bypass event traffic. These would only be active during event days and may be able to be placed to avoid specific bottlenecks. Implementing temporary dedicated lanes or something more permanent may also require the establishment of a multi-jurisdictional causeway authority. Currently



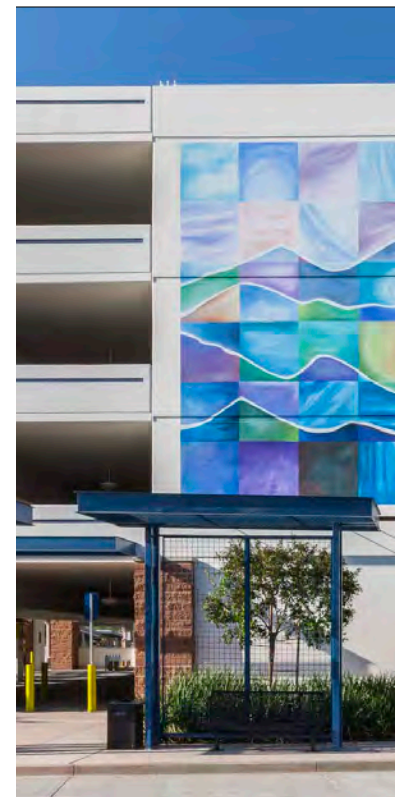


it appears that sufficient right of way exists to develop a solution; however, these may infringe on current greenspace or other protected land. Similarly, it would take a redesign of the causeway, but reversible lanes which increase capacity on a directional basis would add capacity.

It is important to locate park and ride facilities west of the Toll. This would enable drivers to park off site and shuttle in on higher capacity vehicles, thereby replacing 20 to 30 cars per bus. On non-event days, these could be used to shuttle people to Crandon Park and Bill Baggs State Park, which does not always have adequate parking. Another concept would be to shuttle people to events using water taxis, with launching points at each of the County Marinas. This would enable parking at these counties as seen at Haulover, Coconut Grove, Matheson Hammock, Black Point and Homestead Bayfront Marinas, further dispersing traffic. Used for special events, this could act as a pilot program for a more permanent system. It is recommended that a concept similar to this be implemented for the Boat Show.

Less intrusive but symbiotic to the other suggested items is the ability to provide travel demand management for special events. Each event should have a detailed maintenance of traffic plan, shuttle services, and parking limitations. Overall travel demand management relies on intelligent transpiration systems, real time messaging of parking capacities, roadway conditions, etc. Today, many crowd sourcing applications like "WAZE," do much of what may be necessary. Similarly, moving the sobriety check points west of the toll gantry or at alternative times would keep the causeway flowing.

Often times when thinking of moving large numbers of people longer distances, the traditional method of thinking is Mass transit, typically in the form of Heavy Rail, like Metrorail, Light Rail, or Bus Rapid Transit, like the Busway. The cost of these systems is prohibitive in many cases, as they can be between \$50 and \$250 Million per mile. The concept of Micro Transit, more similar to a people mover in Downtown Miami, a gondola, water taxi or



sky taxi, all move smaller numbers of people in smaller vehicles. They can be significantly less expensive, with price tags between \$4 and \$10 Million per mile. We know that quick connections from Key Biscayne to the Coconut Grove or Brickell areas would get most people to their destinations and connect them with the Metrorail system, providing regional access.

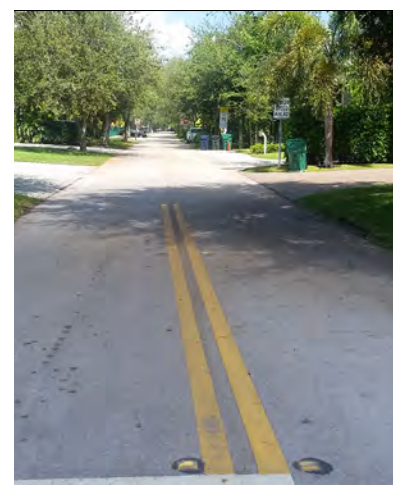
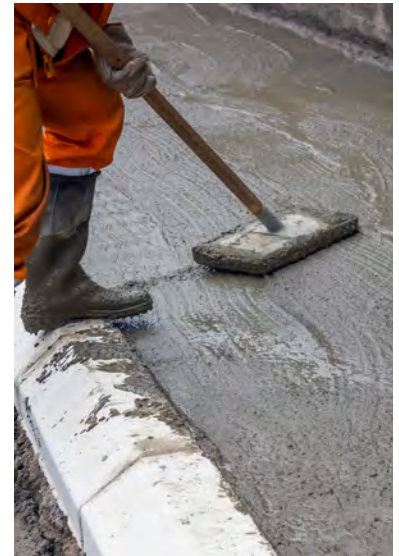
### Solutions for Internal Congestion

Internally, Key Biscayne is congested. There are multiple, cumulative, interconnected reasons for this. They are based on failing intersections which cause bottlenecks in the system. Signal timing is not adequate or coordinated effectively. Many people have the strong desire to travel short distances in their cars. The lack of parking makes them drive around more, creating more congestion. The key to relieving congestion internally is in advancing the cultural shift of people being more willing to travel without the single occupancy vehicle. This approach is iterative and predicated on providing options and additional capacity in all the alternative modes, while streamlining the components of the existing roadway system. Additional lane miles are not planned. This will be done with projects that include:

- ▶ Intersection enhancements
- ▶ Increased Golf Cart Access
- ▶ Parking
- ▶ Transit Facility Improvements
- ▶ Bicycle Facilities
- ▶ Pedestrian Facilities
- ▶ Elderly Services

A primary aggravation to resident and the most obvious cause of congestion is at the bottlenecks caused by the traffic signals. Signal timing and progression needs to be evaluated and coordinated at all of the Crandon Boulevard intersections.

Real time adaptive signal controls are recommended. Traditional signal timing is done by setting the light timing for certain hours



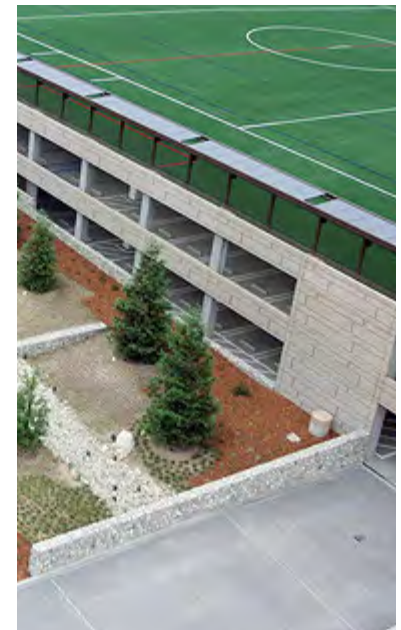


of the day and certain days of the week. They don't easily accommodate frequent changes. A computer algorithm can detect vehicles at each intersection in real time and can manipulate the timing of the signals based on the traffic using it at every cycle of the light. It can also be programmed to give signal priority to emergency and transit vehicles. This can increase intersection efficiency significantly.

Golf carts add capacity to the system by moving people in smaller vehicles. It is important to provide increased access to golf carts off of Fernwood Drive. Priority golf cart parking is recommended in the shopping areas and parks.

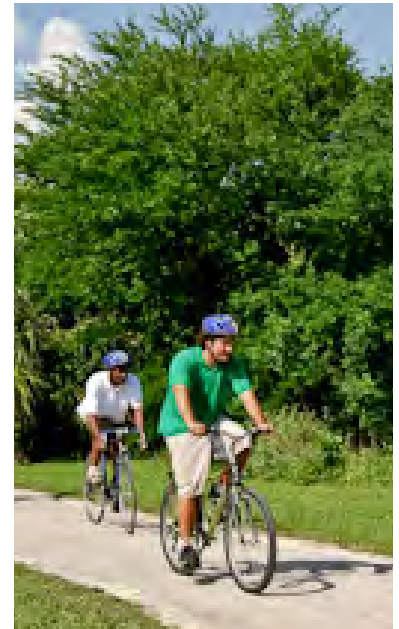
Parking is a definite issue. This can be handled with a combination of solutions, including the implementation of a new garage; providing alternatives to the automobile with better bicycle, pedestrian and transit infrastructure so people don't have to drive; implementing designated waiting areas for pickups; more parking enforcement and a parking valet. A policy decision that should be considered is that of additional parking, because it is the most costly aspect of parking management. There is a parking deficit in the Village center area of more than 100 spaces. One school of thought is to use that deficit as an incentive to get people to walk, bike or transit into the core civic area. An alternative approach is to maximize the capacity of traditional automobile oriented infrastructure like travel lanes and parking, then shift to alternative modes. A new parking garage should be built to maximize the capacity of all types. These can be underground with civic space on top, or above ground with athletic fields on the roof.

While pedestrian infrastructure exists and is of high quality, there are several opportunities that present themselves related to providing a better perception of pedestrian safety. People should be encouraged to use it, as opposed to very short automobile trips. This aspect of the project would focus on installing missing gaps in sidewalks, completing lighting and mitigating flooding, all in an attempt to make walking a viable option. The



Safe Routes To School grant, developed as a precursor to this study, has won over \$800,000 in funds to implement that program. Enhancements to intersections along Crandon Boulevard are a top priority. Installing high visibility crosswalks, crosswalk lighting and ADA complaint facilities is important. Pedestrian access to commercial areas from Fernwood Road is recommended. Programs that would further encourage parents to allow their children to walk and bike to school are important in marketing the system and perpetuating this behavior. Additional crossing guards would lend safety to the mix. Programs like Bike Rodeos, bike to school days, walking school buses, and other safety and educational programs that are educational, and offer rewards are encouraged.

Bicycle safety and its viability as an alternative transportation mode is also a critical component of a multimodal transportation system, giving people options. Multiple issues exist when dealing with cycling. There are two distinct user groups. The recreational cyclist, who uses the Causeway and Crandon Boulevard as a training corridor. These users ride in large pelotons, often at odd hours, and often more than two-abreast, which is not legal and creates a safety hazard. This is an enforcement issue that should be acted upon. A second group of users are local people moving from place to place within the Village for various reasons. While Key Biscayne is not devoid of cycling infrastructure, and most of the island does not need additional on road infrastructure such as bike lanes, it does need attention to address speeding and safety, which should include the reduction of conflict points between cyclists/pedestrians and automobile traffic. Additional bicycle parking amenities should be encouraged in shopping areas or mandated as part of new development.







## V. Project Development

This chapter introduces the actual projects, each of which are listed in the accompanying Project Bank with a stated purpose, need, description of the project, and an estimated cost. The Transit Mobility Plan has identified multimodal transportation and mobility issues across the community by talking with the citizens and analyzing transit and roadway data and existing pedestrian and bicycling facilities. A set of multimodal projects were developed based on both of these levels of analysis, focused on identifying the major facilities or the movement of people.

The development of projects for implementation is both an art and a science. Planners, decisions makers, and citizens all dream of what can be, and all of these stakeholders may hold differing viewpoints of how to progress into the future. To gain consensus and implement projects, a community must agree to, and want, what is being planned. This project placed great effort into both the art (finding out what is

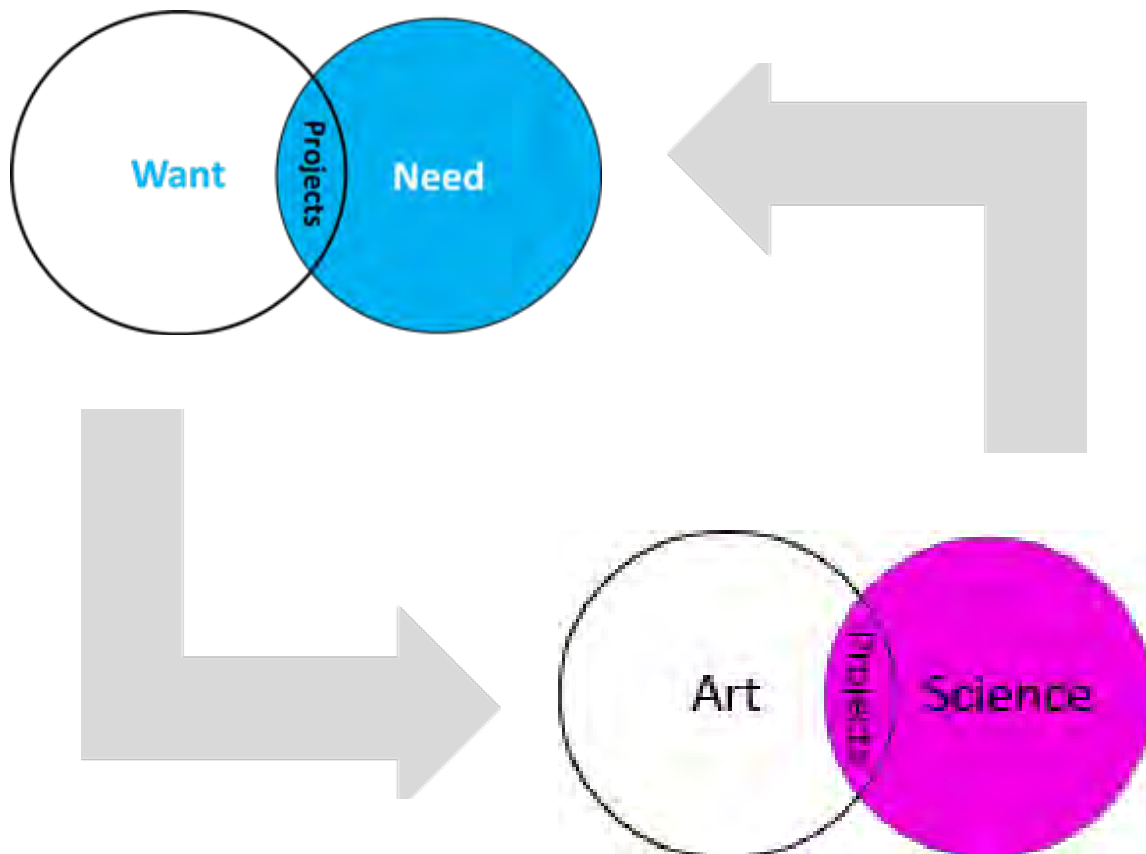
wanted), and the science (finding out what is needed). Through the analysis of existing conditions and needs, the Needs of the community from a technical standpoint are developed. What is wanted then stems from discussions and feedback resulting from significant engagement of the public in building consensus.

As part of this process the issues that were initially discussed and presented in the previous chapter were organized, streamlined and defined as projects. First, the projects were evaluated based on cost, benefits, needs, and community desire in the creation of the overall project bank. After detailed consideration of these criteria, ideas from the initial lists were either utilized, consolidated, or dropped.

In creating a formal project listing, projects from the initial lists that had no significant impact because they were not addressing a formal need were generally dropped from consideration.

Some projects fell into the same overall category but were consolidated in order to create a more easily read report. These may have individual components which may be implemented separately, such as the infill of specific gaps in the sidewalk system, addressing crosswalk issues at intersections, and implementation of various aspects of the bicycle network system. Projects or ideas that approached a similar problem in different ways were also consolidated after evaluation.

The projects developed on a Village-wide basis are attached as project bank items. In Task V, these projects were then grouped further into specific corridor and hub areas for prioritization and implementation purposes.





Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Racks	Bicycle	Internal	Install Bicycle Racks within the Village	Field visits established a bicycle parking deficit within the Village	The Village will fund the addition of bicycle racks at commercial and civic areas. With Commercial area installation, the Village will have to work with existing property owners. Bicycle racks should also be installed at all existing and future planned parks.	\$ 120,000
Cycle Tracks	Bicycle	Internal	Design and Construct a Cycle Tracks system on Crandon Boulevard	Enhancements to bicyclist safety on Crandon, which has the most bicyclists, can be effected through separation of bicyclists from general vehicular traffic. This is particularly important for younger riders, which are increasing in numbers within Key Biscayne due to demographic shifts and emphasis on healthy, alternative mode travel for local children. Stakeholder identified.	This project will allow the Village to redesign Crandon Boulevard with a cycle tracks system to enhance bicyclist safety and create separation of traffic. Cycle track implementation in Crandon Boulevard has multiple alternatives. This includes a two-way track to be installed on the west side of Crandon boulevard, or a one-way track on east and west sides of Crandon, following traffic direction. Each alternative bears a different cost, and a different design. Construction Cost Option 1: \$192,732 Construction Cost Option 2: \$289,098	\$ 289,098
Enhanced Bicycle Crossings	Bicycle	Internal	Provide adequate infrastructure to protect bikers when crossing major intersections and increase bicycle flow. Increase safety.	Some intersections lack the adequate space to provide refuge to bikers while waiting for a light to cross on major intersections.	Redesign of intersections to provide for bicycle refuge areas as needed, as well as differentiated bicycle crossing signals and bike pathways. Where needed, a holding area should be established at the intersections. Refuges shall be big enough to accommodate bikers and pedestrians, and timing shall be adequate as well. Signalization should indicate clearly that it controls bike movements to avoid confusion with pedestrian movement.	TBD
Bicycle Enforcement	Bicycle/Policy	Internal	Increase enforcement on bicycling laws within Village.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires additional officers to ensure appropriate Village police staffing. Cost indicated is additional yearly cost. It should be explored whether non-sworn personnel can be utilized for the function of deterrence as well. Fines should be enacted, with enforcement decreasing over time as issue ameliorates.	\$ 140,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Implementation of Safe Routes to School	Bicycle/Pedestrian	Internal	Implement Safe Routes to School report recommendations	Report recommendations provide for enhanced Bicycling/Pedestrian safety along designated routes for children	Safe Routes To Schools is a federally mandated program emergin from the Safe, Accountable, Flexible, Transporation Equity Act, a Legacy for Users (SAFTEA-LU) and continued under the Moving Ahead for Progress in the 21 <sup>st</sup> Century Act (MAP-21). It is an effort to create a more favorable environment for non-motorized transportation to and from local schools. The Village was recently awarded funding to implement the entire study.	\$ 837,531
Adaptive Signalization Technology	Roadway	Internal	Install adapative signal technology along Crandon Boulevard.	Signal timing along Crandon Boulevard is broken, resulting in a situation where intersections that can be at LOS C, are operating at LOS F.	Adaptive signalization allows for real-time adjustments to signal timing based on existing traffic. Installation of technology needed.	\$ 212,600
Bicycle/Pedestrian/Golf Cart Access to Crandon Shops	Bicycle/Pedestrian/Golf Carts	Internal	Reduce local needs to drive short distances and ease parking deficiencies at Crandon Shops while providing direct access for pedestrian and other modes of transportation through Fernwood Road	Any infrastructure improvements that encourage people to opt out of the cars when visiting the shops is a step in the right direction in reducing short distance driving. Parking spaces is a scarce commodity in Key Biscayne, and especially at Crandon Boulevard's commercial areas, as noted by public outreach and field reviews.	Enhance sidewalks along Fernwood and open the perimeter wall in the back of the shops where is found to be more appropriate. Where suitable, bike racks on the back of the shops shall be provided.	\$ 47,500



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Sidewalk Infill	Pedestrian	Internal	The purpose of this project is to fill in the gaps in the sidewalk infrastructure. The sidewalk is the most obvious element of the pedestrian network, therefore a primary objective of this plan is to provide mobility by ensuring a complete and inclusive sidewalk system. By including short, direct pedestrian connections between adjoining land uses can make walking (and bicycling) more attractive.	Gaps in sidewalk network decrease mobility for pedestrians, and improvements are needed to make walking a viable choice. Most of Village is within a 0.5 mile walk from the Civic Center and Commercial areas.	Location of missing sidewalks are noted in the map and attached table. Prioritization of these sidewalk improvements should be based on proximity to schools, parks and bus stops, and then to existing businesses. Primarily, the purpose is to create a cohesive connected walking network. This amount does not include the gaps noted in the Safe Routes to School report.	\$ 370,000
Lighting - Install LED	Bicycle/ Pedestrian	Internal	Install lighting within the Village's local roadways, upgrade to LED lights with existing lighted areas	Nighttime mobility for walking and bicycling requires lighting not always available or proper for walkers and cyclists.	The Village is already proceeding some changes to its lighting system, and the program should continue until all of the Village is complete. Replace existing bulb with new energy-efficient LED bulbs. Where new lighting is required, specifications shall call out LED bulbsLED lighting in the long run is a more efficient technology, since it reduces maintenance costs and consume less energy. In addition its users conveys a message of environmentally conscious community, which is aligned with the values of Key Biscayne residents.	TBD

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Education Safety Program	Bicycle	Internal	The purpose of this project is to assure that cyclists and motorists alike are practicing safe and courteous behavior to minimize accidents and therefore encourage more people to cycle.	South Florida is one of the most dangerous places in the nation to ride a bicycle, in large part for lack of bicycle facilities and the spatial and operational characteristics of our cities. Educating cyclists how to properly ride on our streets, as well as educating motorists how to be aware of and treat cyclists, will assist in making the roads safer.	Develop a bicycle/driver educational pamphlet, work to educate the public on bicycle and driver safety.	\$ 10,000
Village K-Uber	Transit	Internal	Create a local version of Uber which will stay solely on Key Biscayne.	Reduction of parking needs and personal vehicle use are needed. Parking study indicated that searching for parking adds to local congestion.	Implement a Village-wide Uber. Conduct implementation study to determine if the program should be Village or contractor run.	\$50,000, TBD
Village Driverless Shuttles	Transit	Internal	To develop a network of driverless transit with designated stops and/or an on-demand system.	Driverless shuttles can potentially increase cost effectiveness for a community of Key Biscayne's size in providing transit.	Evaluate driverless shuttle system's potential by looking at pilot studies in other cities in 2016. Devise means of implementation of system, and any necessary infrastructure to enhance system.	\$ 750,000
Shopping Delivery Services	Transit	Internal	Enact or encourage service to deliver groceries to residents, thus reducing number of trips with destination to supermarkets and shopping plazas. Alternatively, this can be used to enhance transit usage for those who still wish to have the shopping experience.	Beyond the comfort of having groceries delivered to your front door, a 22% or residents in Key Biscayne are older than 60 years and might be the largest clientele of this service, which has been utilized in other areas.	Encourage local shops to offer delivery services. Where needed, the Village may opt to contractually incentive the program with specific vendors.	\$ 25,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Parking Structure	Roadway	Internal	Provide more parking space to alleviate the deficit identified in the study of the Civic Center area.	The Civic Center area has a parking deficit of up to 124 spaces.	Design and implement a new structure behind City Hall. In designing the structure, it should be noted that existing parking being replaced must be added to the total for the development of the entire structure.	TBD
Complete Traffic Calming	Roadway	Internal	Implement Traffic Calming Study recommendations	Traffic calming needs were determined in prior studies. Traffic calming based on this report is partially complete.	Continue to implement Traffic Calming Study (2012) findings and recommendations.	\$ 1,010,000
Priority Signalization for Emergency Vehicles	Roadway	Internal	Provide priority signalization to emergency vehicles within Key Biscayne.	In times of congestion with the Village, better signalization for emergency vehicles will help optimize response times. This technique has been used in other municipalities with localized congestion issues.	Install priority signal system. Emergency vehicles are equipped with a transponder that emit an emergency signal received on traffic light, thus extending the green light required to clear any queue or congestion in front the of the emergency vehicle. Specific receivers will need to be installed in all intersections. Intersections can be improved for about \$13,500 each, with transponders on vehicles adding additional costs per vehicle.	\$ 105,000
Crosswalk Light at Crandon and Mashta	Pedestrian	Internal	Install crosswalk lights at Crandon Boulevard and Mashta Drive.	Pedestrian safety will be enhanced with the addition of a pedestrian crossing signal at a controlled intersection.	Install pedestrian crosswalk signal at Crandon Boulevard and Mashta Drive	\$ 76,000
Audible Crosswalk Signalization	Pedestrian	Internal	Increase accessibility and mobility for persons with visual disability or young persons.	Increases safety for communities with a larger elderly population, children.	Audible devices typically will generate an audible sound to alert people that it is safe to cross, and should be installed at all intersections along Crandon Boulevard.	\$ 74,000
Signal Progression (Crandon Boulevard)	Roadway	Internal	Reduce congestion at intersection due to failing intersection LOS resulting from improperly timed signals.	Signal retiming necessary to eliminate failing intersection LOS along Crandon Boulevard, a main cause of local vehicular travel delays.	Each of these intersections require reconfigurations to signal timing, which will result in the intersection no longer having failing level of service. In addition, the re-signalization of these intersections, due to their proximity to each other, should be part of a greater corridor signal progression analysis to ensure that the changes at each intersection will appropriately sync to ensure improved traffic flow.	\$ 131,000

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Address Local Flooding	Roadways/ Pedestrian/ Bicyclist	Internal	Address floding withn Village	Certain areas within the Village flood, creating difficulties in access for vehicles, pedestrians, and bicyclists	Identify areas of flooding and ameliorate.	In progress
Pedestrian Refuge at West Enid/ Crandon Boulevard	Pedestrian	Internal	Enhance pedestrian safety at crossing on Crandon Boulevard.	Through the analysis and public involvement of this study, it became evident that the public would like safer pedestrian access to and from various locations. From site reconnaissance it was noticed that pedestrian street crossings are difficult, with pedestrians not having appropriate time to cross at certain intersections.	Install Pedestrian island as refuge area at West Enid/Crandon Boulevard	\$ 6,500
LAP certification	Policy	Internal	Coordinate with staff and FDOT to become LAP certified	LAP certification is necessary to ensure local control of grant funding administration. FDOT is requiring local recertification for all municipalities.	Update training and policies as part of FDOT program to qualify for LAP certification status.	\$ 10,000
Total						\$ 4,214,229



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Reversible Lanes on Rickenbacker	Roadway	External	Study, design, and implement a reversible lane along the Rickenbacker Causeway.	Heavy traffic on Rickenbacker Causeway during events reduce the roadway LOS from C to F.	Implement a new reversible lane on Rickenbacker Causeway. A reversible lane offers the transit management entity the opportunity to increase traffic flow in one direction based on specific traffic peaks before and after major events. Temporary traffic control plan can be implemented and removed afterwards. A toll system could be set up as part of the program, with registered Key Biscayne residents bypassing the toll.	TBD
Parking Structure (Before Rickenbacker)	Roadway	External	Locate and enter into agreement to develop a new park and ride location before the Rickenbacker Toll.	Special events at the Crandon Tennis Center and those to occur in the future once the improvement to the Marine Stadium Park are completed, have a great impact in traffic along Crandon Blvd. Having a parking structure before the toll area allows for a special events staging area and a potential park and ride for Bill Baggs State Park.	Connection to existing mass transit in the county will encourage people to use remote parking when attending major events in Key Biscayne or Virginia Key. Shuttle service will connect attendants to their venues with a simple bus ride. A potential location for a parking structure is the existing parking lot at Viscaya Metrorail station.	\$ 5,000,000
Aerial Cable Transit	Roadway	External	Create and implement a aerial cable transit sstem (gondolas) connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic, using gondolas, connecting to proposed Miami-Dade system currently under study. At approximately 18 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, with stations developed to service the route. Each gondola seats 4 to 15 people, depending on model, and travels at a top speed of 14 mph.	\$ 115,000,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Air Taxis	Transit	External	Create and implement a sky car/taxi system connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	Review pilot programs for sky taxi systems and determine how to implement. Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic. At approximately 5 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, while at the same time providing a scalable approach. Vehicles on the track can reach up to 60 mph, far higher than vehicular speeds on the Rickenbacker Causeway (45 mph). Each 4 person vehicle costs approximately \$25,000 to \$30,000. Additional costs include station areas for the transit service.	\$ 36,000,000
Bicycle Enforcement (Rickenbacker)	Policy	External	Increase enforcement on bicycling laws on Rickenbacker Causeway.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires coordination with Miami for enforcement.	NA
Rickenbacker Causeway Authority	Policy	External	Examine if and how a Rickenbacker Causeway Authority could be created.	While the adminsitration of the Rickenbacker Causeway directly affects all aspects of Key Biscayne life, little control is available in its governance. The creation of an authority will not only allow for toll funds to be directly channeled towards localized improvements, but will also allow for a more equitable seat at the table for all parties.	Review existing legislation and conduct intergovernmental coordination to create a governing body designed to enhance the administration of the Rickenbacker Causeway.	\$ 10,000



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Intergovernmental Coordination	Policy	External	Coordinate with City of Miami, Miami-Dade County, MDT, and Bill Baggs State Park	Roadways, sobriety checkpoints, event planning, permitting and mangement have effects on Rickenbacker Causeway that have adverse effects on Key Biscayne but are under the jurisdiction of the other places.	Coordinate with other local governmental authorities regarding events at locations along the Rickenbacker Causeway, including major events and sobreity checkpoints. The village should make efforts to increase coordination with the development of certain events to mitigate impacts on local traffic.	NA
Address Student Busing Issues (MAST)	Transit/Policy	External	Address busing capacity shortage for MAST	School busing undercapacity for MAST students from Key Biscayne. Students reported as sitting on the floor of the bus, and other issues causes parents to drive their children more to school, increasing local traffic and congestion at Crandon/Harbor.	Negotiate for more school busing. Alternatively, purchase buses and run morning shuttles. Can be incorporated into roadway and other transit programs.	\$ 300,000
Total						\$ 156,310,000

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Water Taxi	Transit	Internal/ External	Develop a water taxi pilot program, with stops in Key Biscayne, modeled after the 2010 Virginia Key Master Plan.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted.	The development of a water taxi system will require the creation of routes, associated headways, and the procurement of water taxis as well as potential construction of docking areas. Marketing is also necessary, as is intergovernmental coordination for transit and permitting purposes. The cost estimate provided is for a 1 year pilot program.	\$ 630,000.00
Bike Share (Citibike)	Bicycling	Internal/ External	The purpose of this project is to provide an expansion to existing bicycle rentals options on Key Biscayne, and an alternative mode for outside visitors.	Increased bicycle access may lead to increased bicycling and increased mobility. This will provide additional impetus for riders from Citibike, which connects to Downtown Miami and Coconut Grove.	Install Bikeshare Stations on Key Biscayne, work with City of Miami, Bill Baggs State park to locate stations. Negotiate with CitiBike	\$ 40,000.00
Bill Baggs Information System	Policy/ Roadway	Internal/ External	Develop an information sharing system for Bill Baggs capacity to reduce vehicular trips to the park.	Bill Baggs park receives close to a million visitors each year. When at capacity, drivers do not know, and cross into Key Biscayne, creating additional unnecessary traffic.	Work with the park to create an app or data system, which would then be available to access on smartphones, websites, and be posted before the Rickenbacker Causeway's entrance. In developing this information system, education about alternative modes, such as bicycling and transit, should be provided as part of the system.	\$ 50,000.00
Bus Stop and Transit Planning App improvements (Pilot Program)	Transit	Internal/ External	The purpose of this project is to make transit more attractive to potential riders by providing a transit trip planning and time application at key locations in the City. While most apps will require a phone, this will be designed so as to increase public access, taking into account the lower usage of technology utilized by the elderly in the community.	Improvements to Transit amenities regarding trip planning will increase system accessibility and potentially raise ridership.	Alongside internal transit, the Village will install interactive signs at specific stations, which would involve an updatable electronic sign linked to the current real-time system utilized by the MDT. In addition, the app will be developed in such a way that riders can select their destination on the screen, via selection of specific stops and have listed for them the buses they must take, where to transfer if needed, the bus times, and other pertinent information. The app should be structured to incorporate the desired internal transit system to be utilized by Key Biscayne.	\$ 70,000.00
Total						\$ 790,000.00



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Racks	Bicycle	Internal	Install Bicycle Racks within the Village	Field visits established a bicycle parking deficit within the Village	The Village will fund the addition of bicycle racks at commerical and civic areas. With Commercial area installation, the Village will have to work with existing property owners. Bicycle racks should also be installed at all existing and future planned parks.	\$ 120,000
Cycle Tracks	Bicycle	Internal	Design and Construct a Cycle Tracks system on Crandon Boulevard	Enhancements to bicyclist safety on Crandon, which has the most bicyclists, can be effected through separation of bicyclists from general vehicular traffic. This is particulay important for younger riders, whicha re inceraasing in numbers within Key Biscayne due to demographic shifts and emphasis on healthy, alternative mode travel for local children. Stakeholder identified.	This project will allow the Village to redesign Crandon Boulevard with a cycle tracks system to enhance bicylist safety and create separation of traffic. Cycle track implementation in Crandon Boulevard has multiple alternatives. This includes a two-way track to be installed on the west side of Crandon boulevard, or a one-way track on east and west sides of Crandon, following traffic direction. Each alternative bears a different cost, and a differnt design. Construction Cost Option 1: \$192,732 Construction Cost Option 2: \$289,098	\$ 289,098
Enhanced Bicycle Crossings	Bicycle	Internal	Provide adequate infrastructure to protect bikers when crossing major intersections and increase bicycle flow. Increase safety.	Some intersections lack the adequate space to provide refuge to bikers while waiting for a light to cross on major intersections.	Redesign of intersections to provide for bicycle refuge areas as needed, as well as differentiated bicycle crossing signals and bike pathways. Where needed, a holding area should be established at the intersections. Refuges shall be big enough to accommodate bikers and pedestrians, and timing shall be adequate as well. Signalization should indicate clearly that it controls bike movements to avoid confusion with pedestrian movement.	TBD



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Implementati on of Safe Routes to School	Bicycle/ Pedestrian	Internal	Implement Safe Routes to School report recommendations	Report recommendations provide for enhanced Bicycling/Pedestrian safety along designated routes for children	Safe Routes To Schools is a federally mandated program emergin from the Safe, Accountable, Flexible, Transporation Equity Act, a Legacy for Users (SAFTEA-LU) and continued under the Moving Ahead for Progress in the 21 <sup>st</sup> Century Act (MAP-21). It is an effort to create a more favorable environment for non- motorized transportation to and from local schools. The Village was recently awarded funding to implement the entire study.	\$ 837,531.00
Adaptive Signalization Technology	Roadway	Internal	Install adapative signal technology along Crandon Boulevard.	Signal timing along Crandon Boulevard is broken, resulting in a situation where intersections that can be at LOS C, are operating at LOS F.	Adaptive signalization allows for real-time adjustments to signal timing based on existing traffic. Installation of technology needed.	\$ 212,600.00
Bicycle/Pedes trian/Golf Cart Access to Crandon Shops	Bicycle/ Pedestrian/ Golf Carts	Internal	Reduce local needs to drive short distances and ease parking deficiencies at Crandon Shops while providing direct access for pedestrian and other modes of transportation through Fernwood Road	Any infrastructure improvements that encourage people to opt out of the cars when visiting the shops is a step in the right direction in reducing short distance driving. Parking spaces is a scarce commodity in Key Biscayne, and especially at Crandon Boulevard's commercial areas, as noted by public outreach and field reviews.	Enhance sidewalks along Fernwood and open the perimeter wall in the back of the shops where is found to be more appropriate. Where suitable, bike racks on the back of the shops shall be provided.	\$ 47,500.00



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Sidewalk Infill	Pedestrian	Internal	The purpose of this project is to fill in the gaps in the sidewalk infrastructure. The sidewalk is the most obvious element of the pedestrian network, therefore a primary objective of this plan is to provide mobility by ensuring a complete and inclusive sidewalk system. By including short, direct pedestrian connections between adjoining land uses can make walking (and bicycling) more attractive.	Gaps in sidewalk network decrease mobility for pedestrians, and improvements are needed to make walking a viable choice. Most of Village is within a 0.5 mile walk from the Civic Center and Commercial areas.	Location of missing sidewalks are noted in the map and attached table. Prioritization of these sidewalk improvements should be based on proximity to schools, parks and bus stops, and then to existing businesses. Primarily, the purpose is to create a cohesive connected walking network. This amount does not include the gaps noted in the Safe Routes to School report.	\$ 370,000.00
Lighting - Install LED	Bicycle/Pedestrian	Internal	Install lighting within the Village's local roadways, upgrade to LED lights with existing lighted areas	Nighttime mobility for walking and bicycling requires lighting not always available or proper for walkers and cyclists.	The Village is already proceeding some changes to its lighting system, and the program should continue until all of the Village is complete. Replace existing bulb with new energy-efficient LED bulbs. Where new lighting is required, specifications shall call out LED bulbsLED lighting in the long run is a more efficient technology, since it reduces maintenance costs and consume less energy. In addition its users conveys a message of environmentally conscious community, which is aligned with the values of Key Biscayne residents.	TBD

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Education Safety Program	Bicycle	Internal	The purpose of this project is to assure that cyclists and motorists alike are practicing safe and courteous behavior to minimize accidents and therefore encourage more people to cycle.	South Florida is one of the most dangerous places in the nation to ride a bicycle, in large part for lack of bicycle facilities and the spatial and operational characteristics of our cities. Educating cyclists how to properly ride on our streets, as well as educating motorist how to be aware of and treat cyclists, will assist in making the roads safer.	Develop a bicycle/driver educational pamphlet, work to educate the public on bicycle and driver safety.	\$ 10,000.00
Crosswalk Light at Crandon and Mashta	Pedestrian	Internal	Install crosswalk lights at Crandon Boulevard and Mashta Drive.	Pedestrian safety will be enhanced with the addition of a pedestrian crossing signal at a controlled intersection.	Install pedestrian crosswalk signal at Crandon Boulevard and Mashta Drive	\$ 76,000.00
Audible Crosswalk Signalization	Pedestrian	Internal	Increase accessibility and mobility for persons with visual disability or young persons.	Increases safety for communities with a larger elderly population, children.	Audible devices typically will generate an audible sound to alert people that it is safe to cross, and should be installed at all intersections along Crandon Boulevard.	\$ 74,000.00
Address Local Flooding	Roadways/ Pedestrian/ Bicyclist	Internal	Address floding withn Village	Certain areas within the Village flood, creating difficulties in access for vehicles, pedestrians, and bicyclists	Identify areas of flooding and ameliorate.	In progress
Pedestrian Refuge at West Enid/Crandon Boulevard	Pedestrian	Internal	Enhance pedestrian safety at crossing on Crandon Boulevard.	Through the analysis and public involvement of this study, it became evident that the public would like safer pedestrian access to and from various locations. From site reconnaissance it was noticed that pedestrian street crossings are difficult, with pedestrians not having appropriate time to cross at certain intersections.	Install Pedestrian island as refuge area at West Enid/Crandon Boulevard	\$ 6,500.00



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bike Share (Citibike)	Bicycling	Internal/ External	The purpose of this project is to provide an expansion to existing bicycle rentals options on Key Biscayne, and an alternative mode for outside visitors.	Increased bicycle access may lead to increased bicycling and increased mobility. This will provide additional impetus for riders from Citibike, which connects to Downtown Miami and Coconut Grove.	Install Bikeshare Stations on Key Biscayne, work with City of Miami, Bill Baggs State park to locate stations. Negotiate with CitiBike	\$ 40,000.00
Total						\$ 2,083,229.00

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Village K-Uber	Transit	Internal	Create a local version of Uber which will stay solely on Key Biscayne.	Reduction of parking needs and personal vehicle use are needed. Parking study indicated that searching for parking adds to local congestion.	Implement a Village-wide Uber. Conduct implemenation study to determine if the program should be Village or contractor run.	\$50,000, TBD
Village Driverless Shuttles	Transit	Internal	To develop a network of driverless transit with designated stops and/or an on-demand system.	Driverless shuttles can potentially increase cost effectiveness for a community of Key Biscayne's size in providing transit.	Evalaute driverless shuttle system's potential by looking at pilot studies in other cities in 2016. Devise means of implementation of system, and any necessary infrstucture to enhance system.	\$ 750,000.00
Shopping Delivery Services	Transit	Internal	Enact or encourage service to deliver groceries to residents, thus reducing number of trips with destination to supermarkets and shopping plazas. Alternatively, this can be used to enhance transit usage for those who still wish to have the shopping experience.	Beyond the comfort of having groceries delivered to your front door, a 22% or residents in Key Biscayne are older than 60 years and might be the largest clientele of this service, which has been utilized in other areas.	Encourage local shops to offer delivery services. Where needed, the Village may opt to contractually incentive the program with specific vendors.	\$ 25,000.00
Air Taxis	Transit	External	Create and implement a sky car/taxi system connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	REview pilot programs for sky taxi systems and determine how to implement. Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic. At approximately 5 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, while at the same time providing a scalable approach. Vehicles on the track can reach up to 60 mph, far higher than vehicular speeds on the Rickenbacker Causeway (45 mph). Each 4 person vehicle costs approximately \$25,000 to \$30,000. Additional costs include station areas for the transit service.	\$ 36,000,000.00



Water Taxi	Transit	Internal/External	Develop a water taxi pilot program, with stops in Key Biscayne, modeled after the 2010 Virginia Key Master Plan.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted.	The development of a water taxi system will require the creation of routes, associated headways, and the procurement of water taxis as well as potential construction of docking areas. Marketing is also necessary, as is intergovernmental coordination for transit and permitting purposes. The cost estimate provided is for a 1 year pilot program.	\$ 630,000.00
Bus Stop and Transit Planning App improvements (Pilot Program)	Transit	Internal/External	The purpose of this project is to make transit more attractive to potential riders by providing a transit trip planning and time application at key locations in the City. While most apps will require a phone, this will be designed so as to increase public access, taking into account the lower usage of technology utilized by the elderly in the community.	Improvements to Transit amenities regarding trip planning will increase system accessibility and potentially raise ridership.	Alongside internal transit, the Village will install interactive signs at specific stations, which would involve an updatable electronic sign linked to the current real-time system utilized by the MDT. In addition, the app will be developed in such a way that riders can select their destination on the screen, via selection of specific stops and have listed for them the buses they must take, where to transfer if needed, the bus times, and other pertinent information. The app should be structured to incorporate the desired internal transit system to be utilized by Key Biscayne.	\$ 70,000.00
Total						\$ 37,475,000.00

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Adaptive Signalization Technology	Roadway	Internal	Install adaptive signal technology along Crandon Boulevard.	Signal timing along Crandon Boulevard is broken, resulting in a situation where intersections that can be at LOS C, are operating at LOS F.	Adaptive signalization allows for real-time adjustments to signal timing based on existing traffic. Installation of technology needed.	\$ 212,600.00
Parking Structure	Roadway	Internal	Provide more parking space to alleviate the deficit identified in the study of the Civic Center area.	The Civic Center area has a parking deficit of up to 124 spaces.	Design and implement a new structure behind City Hall. In designing the structure, it should be noted that existing parking being replaced must be added to the total for the development of the entire structure.	TBD
Complete Traffic Calming	Roadway	Internal	Implement Traffic Calming Study recommendations	Traffic calming needs were determined in prior studies. Traffic calming based on this report is partially complete.	Continue to implement Traffic Calming Study (2012) findings and recommendations.	\$ 1,010,000.00
Priority Signalization for Emergency Vehicles	Roadway	Internal	Provide priority signalization to emergency vehicles within Key Biscayne.	In times of congestion with the Village, better signalation for emergency vehicles will help optimize response times. This technique has been used in other municipalities with localized congestion issues.	Install priority signal system. Emergency vehicles are equipped with a transponder that emit an emergency signal received on traffic light, thus extending the green light required to clear any queue or congestion in front the of the emergency vehicle. Specific receivers will need to be installed in all intersections. Intersections can be improved for about \$13,500 each, with transponders on vehicles adding additional costs per vehicle.	\$ 105,000.00



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Signal Progression (Crandon Boulevard)	Roadway	Internal	Reduce congestion at intersection due to failing intersection LOS resulting from improperly timed signals.	Signal retiming necessary to eliminate failing intersection LOS along Crandon Boulevard, a main cause of local vehicular travel delays.	Each of these intersections require reconfigurations to signal timing, which will result in the intersection no longer having failing level of service. In addition, the re-signalization of these intersections, due to their proximity to each other, should be part of a greater corridor signal progression analysis to ensure that the changes at each intersection will appropriately sync to ensure improved traffic flow.	\$ 131,000.00
Reversible Lanes on Rickenbacker	Roadway	External	Study, design, and implement a reversible lane along the Rickenbacker Causeway.	Heavy traffic on Rickenbacker Causeway during events reduce the roadway LOS from C to F.	Implement a new reversible lane on Rickenbacker Causeway. A reversible lane offers the transit management entity the opportunity to increase traffic flow in one direction based on specific traffic peaks before and after major events. Temporary traffic control plan can be implemented and removed afterwards. A toll system could be set up as part of the program, with registered Key Biscayne residents bypassing the toll.	TBD
Parking Structure (Before Rickenbacker)	Roadway	External	Locate and enter into agreement to develop a new park and ride location before the Rickenbacker Toll.	Special events at the Crandon Tennis Center and those to occur in the future once the improvement to the Marine Stadium Park are completed, have a great impact in traffic along Crandon Blvd. Having a parking structure before the toll area allows for a special events staging area and a potential park and ride for Bill Baggs State Park.	Connection to existing mass transit in the county will encourage people to use remote parking when attending major events in Key Biscayne or Virginia Key. Shuttle service will connect attendants to their venues with a simple bus ride. A potential location for a parking structure is the existing parking lot at Viscaya Metrorail station.	\$5,000,000

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Aerial Cable Transit	Roadway	External	Create and implement a aerial cable transit sstem (gondolas) connecting Key Biscayne to Miami.	To ease congestion at Harbor/Crandon, alternative means of leaving Key Biscayne must be developed and promoted for destinations along the Rickenbacker Causeway, and connecting to other regional transit systems.	Develop and implement "Microtransit" system connecting Key Biscayne to Miami transit systems to alleviate traffic, using gondolas, connecting to proposed Miami-Dade system currently under study. At approximately 18 million/mile for construction, this system will provide rapid transit at a cost less than a light rail system (appx. \$70 million/mile, or \$420 million to connect Key Biscayne). The route will run approximately 6 miles in order to connect to other transit stops, with stations developed to service the route. Each gondola seats 4 to 15 people, depending on model, and travels at a top speed of 14 mph.	\$ 115,000,000.00
Total						\$ 121,458,600.00



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Bicycle Enforcement	Bicycle/ Policy	Internal	Increase enforcement on bicycling laws within Village.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires additional officers to ensure appropriate Village police staffing. Cost indicated is additional yearly cost. It should be explored whether non-sworn personnel can be utilized for the function of deterrence as well. Fines should be enacted, with enforcement decreasing over time as issue ameliorates.	\$ 140,000.00
Bicycle Enforcement (Rickenbacker)	Policy	External	Increase enforcement on bicycling laws on Rickenbacker Causeway.	Especially during the weekend, it is common to spot large pelotons taking over two or three lanes along Crandon Blvd, thus impacting LOS in the roadway. Safety concerns.	Law enforcement officers, located strategically will penalize those bikers riding beyond their limits, thus impacting negatively the flow of cars and jeopardizing their own safety. Requires coordination with Miami for enforcement.	NA

Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Rickenbacker Causeway Authority	Policy	External	Examine if and how a Rickenbacker Causeway Authority could be created.	While the adminsitration of the Rickenbacker Causeway directly affects all aspects of Key Biscayne life, little control is available in its governance. The creation of an authority will not only allow for toll funds to be directly channeled towards localized improvements, but will also allow for a more equitable seat at the table for all parties.	Review existing legislation and conduct intergovernmental coordination to create a governing body designed to enhance the administration of the Rickenbacker Causeway.	\$ 10,000.00
Intergovernmental Coordination	Policy	External	Coordinate with City of Miami, Miami-Dade County, MDT, and Bill Baggs State Park	Roadways, sobriety checkpoints, event planning, permitting and mangement have effects on Rickenbacker Causeway that have adverse effects on Key Biscayne but are under the jurisdiction of the other places.	Coordinate with other local governmental authorities regarding events at locations along the Rickenbacker Causeway, including major events and sobreity checkpoints. The village should make efforts to increase coordination with the development of certain events to mitigate impacts on local traffic.	NA



Project Name	Project Type	I/E To Village	Purpose	Need	Description	Preliminary Cost Estimate
Address Student Busing Issues (MAST)	Transit/ Policy	External	Address busing capacity shortage for MAST	School busing undercapacity for MAST students from Key Biscayne. Students reported as sitting on the floor of the bus, and other issues causes parents to drive their children more to school, increasing local traffic and congestion at Crandon/Harbor.	Negotiate for more school busing. Alternatively, purchase buses and run morning shuttles. Can be incorporated into roadway and other transit programs.	\$ 300,000.00
Bill Baggs Information System	Policy/ Roadway	Internal/ External	Develop an information sharing system for Bill Baggs capacity to reduce vehicular trips to the park.	Bill Baggs park receives close to a million visitors each year. When at capacity, drivers do not know, and cross into Key Biscayne, creating additional unnecessary traffic.	Work with the park to create an app or data system, which would then be available to access on smartphones, websites, and be posted before the Rickenbacker Causeway's entrance. In developing this information system, education about alternative modes, such as bicycling and transit, should be provided as part of the system.	\$ 50,000.00
LAP certification	Policy	Internal	Coordinate with staff and FDOT to become LAP certified	LAP certification is necessary to ensure local control of grant funding administration. FDOT is requiring local recertification for all municipalities.	Update training and policies as part of FDOT program to qualify for LAP certification status.	\$ 10,000.00
Total						\$ 450,000.00



## VI. Implementation

Implementation of the projects will vary based on local preference. While projects internal to the Village can be effected by the Village, external projects cannot, and thus cannot be easily prioritized. For projects internal to the Village, funding is the main consideration, along with safety. Implementation of items for which there are secured funds, such as the Safe Routes to School program, is of the first priority. In developing the other projects, such as infilling sidewalks or implementing cycle lanes along Crandon Boulevard. Some of these projects are segmentable and in proximity to other projects. These should then be considered along the Safe Routes to School project. While they have to remain separate for budgeting reasons, if there are portions which can be a phase of the same overall project, then cost savings may result.

Signalization and the reduction of immediate problems are also of the highest priority, and projects affecting safety should be implemented immediately. For other projects, further review during the design phase of project development will yield more information about phasing. A second priority is the infilling of the pedestrian network.

Projects external to the Village, as previously discussed, are outside the Village's jurisdiction. However, the Village may choose to incentivize their development by proffering funding, as it has in the past with projects such as the development of MAST Academy on Virginia Key. The nature of the recommendations was to provide the Village with viable options from which it can choose to implement. However, further complicating the selection of projects are their relative costs, as well as the state of some existing technology. Yet, picking the alternatives with the lowest cost has tradeoffs not necessarily inherent, with complications resulting from the multi-jurisdictional nature of Rickenbacker Causeway. Just because a



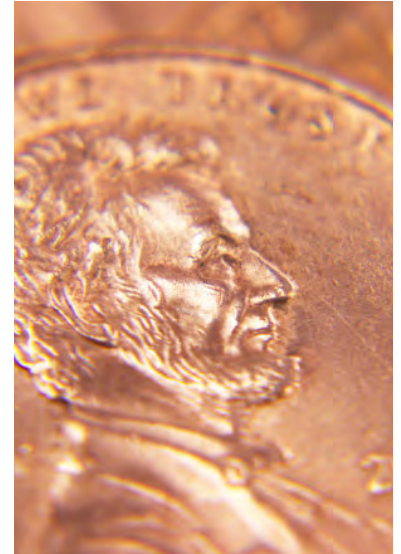
project is viable from a technical standpoint does not mean that it will be approved when negotiations begin. Ultimately, because these projects are outside of the Village's control, prioritization is unlikely to assist the Village; rather, these options become a vital starting point in negotiations with Miami-Dade County and the City of Miami.

In addition, in cases such as with the driverless shuttles and the aerial cars, monitoring pilot programs as they appear in the United States is essential to identifying potential programmatic pitfalls to, allowing for a more smooth implementation of the project by Key Biscayne.

Implementation of these projects will require key policy decisions made by local leadership which is beyond the purview of this report. Ultimately, the projects were designed with creating alternative modes of transportation as the primary impetus for change, to ensure a cultural shift away from single occupant automobile usage. Whether this cultural shift occurs naturally or is incentivized through the financing of various transportation projects is a key policy aspect of this Study. The determination of which will result in the actual implementation plan for the Village moving forward. As each project is selected based on local policy decisions and subsequently funded, it should be placed into the Village's Capital Improvements Plan.

### SOURCES OF FUNDING

Funding for transportation projects comes from three primary sources: Local, State and Federal. Yet each year funding is more difficult to come by. Local governments and counties, face the dilemma of rising costs of transportation projects, increasing traffic volumes and limitations on their ability to generate revenue. The cost of construction and materials increased by 44 percent between 2000 and 2013, more than the 35 percent rise in the overall rate of inflation. Fast changing economic environments put pressure on local governments to keep up with growth and congestion. At the same time, most states limit counties' ability to raise revenue. In Florida in recent



years, the State Legislature has capped property tax, lowered property taxes and has attempted to take away the ability of local governments to tax.

Faced with rapidly increasing construction costs and traffic volumes local governments are finding new funding and financing solutions for transportation. Often, these solutions involve partnerships with other jurisdictions, the private sector and most of all county residents. Unfortunately Florida is a donor state, giving more into the federal system than it gets back. Most monies for large projects are collected locally, provided to the Federal Government, and then reallocated to the states to be administered to agencies like FDOT. Below is a description of relevant funding opportunities at all levels.

### Local Funding

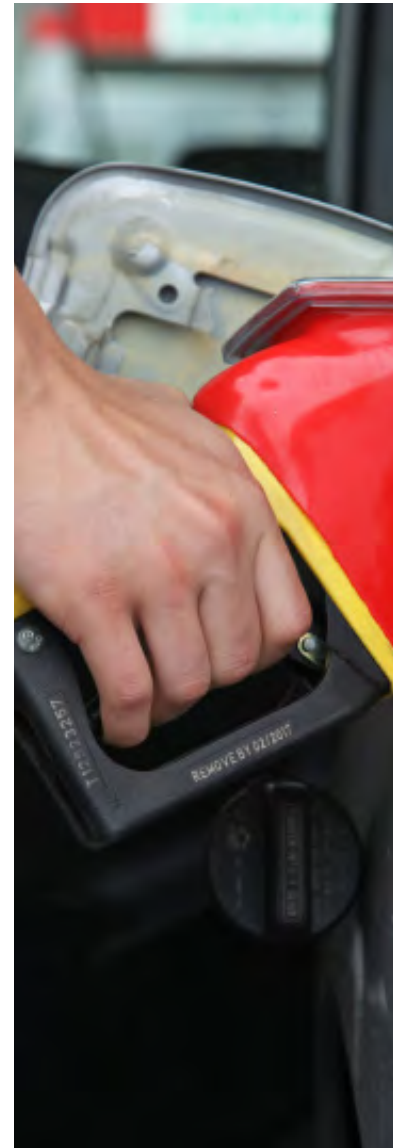
Local funding is money that is generated from within a local government or county. These sources generally rely on property taxes or other funds. Many communities have concurrency fees or impact fees, which can be applied to local infrastructure projects. In high growth communities it is advised that they consider these, in the form of mobility fees, as fair share fee assessments have the capability to provide that developments fund their fair share of the infrastructure needed to support their development.

### Miami-Dade Municipal Grant Program

The Municipal Grant Program (MGP) was developed to have municipalities within Miami-Dade County submit transportation planning proposals to the Metropolitan Planning Organization to receive funding on a competitive basis. Participation in the program requires a minimum 20% funding commitment from the municipality.

Selection criteria include:

- ▶ Level of Service (LOS) benefits of the proposed project.
- ▶ Impact of mobility/traffic circulation gains
- ▶ Intermodal nature of proposal





- ▶ Support of the approved countywide activities of the Unified Planning Work Program
- ▶ Consistency with the applicant's local comprehensive plans

### **Miami-Dade County's Peoples Transportation Plan, ½ Penny Sales Tax**

The People's Transportation Plan (PTP), the half-penny transportation surtax approved by Miami-Dade County voters in November 2002, included \$476 million for public works projects. The PTP funds to be provided were for major highway and road improvements totaling \$309 million, and for neighborhood improvements totaling \$167 million. Twenty percent of the total funding is provided to municipalities, based on their population. Each must spend at least 20% of their funds on transit projects. Importantly this source of funds can be used for a local match to federal funding, an advantage many local areas do not have.

### **Local Option Gas Taxes**

County governments are authorized to levy up to 12 cents of local option fuel taxes in three separate levies on fuel sold within the county. The funds are used for transportation expenditures.

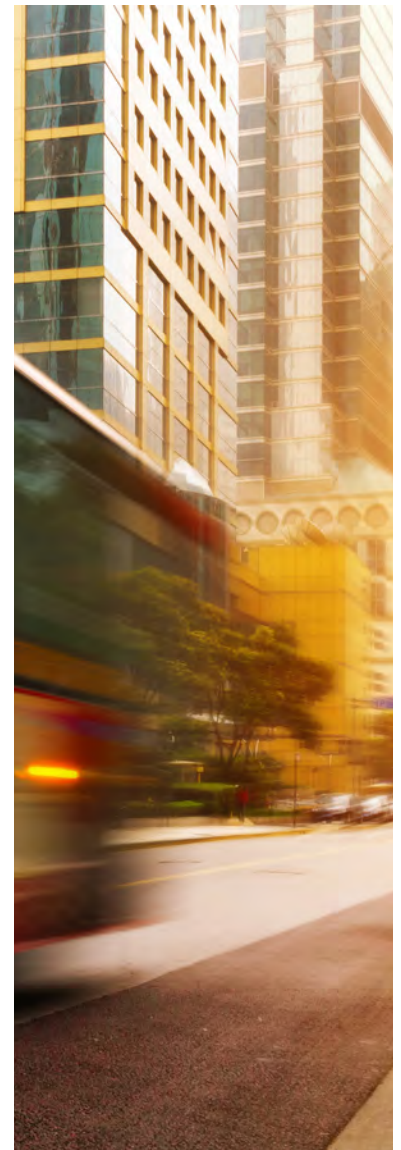
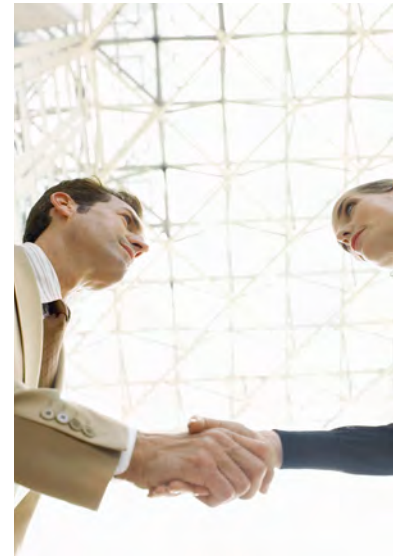
- ▶ The ninth-cent fuel tax is a tax of 1 cent on every net gallon of motor and diesel fuel sold within a county.
- ▶ A tax of 1 to 6 cents on every net gallon of motor and diesel fuel sold within a county.
- ▶ A tax of 1 to 5 cents on every net gallon of motor fuel sold within a county. Diesel fuel is not subject to this tax. The funds may also be used to meet the requirements of the capital improvements element of an adopted local government comprehensive plan.

### **State**

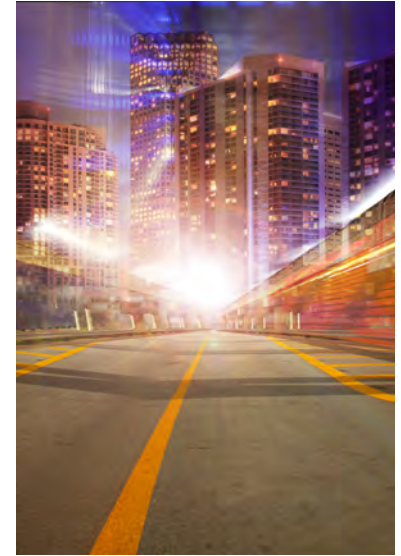
The State of Florida has several funding sources that primarily come from FDOT.

The Governor's newly proposed FY 2016/2017 transportation budget makes the following investments:

- ▶ \$3.3 billion for construction of highway projects to keep Florida's transportation infrastructure among the best in the country.



- ▶ \$153.9 million in seaport infrastructure improvements to keep Florida First in the world for ocean cruise passengers and a major U.S. cargo gateway.
- ▶ \$237.6 million for aviation improvements to keep Florida First in airport infrastructure investments.
- ▶ \$731.9 million for scheduled repair of 48 bridges and replacement of 21 bridges to keep Florida's bridges among the best structures in the country.
- ▶ \$963.4 million for maintenance and operation to keep Florida's infrastructure among the best maintained in the country.
- ▶ \$574 million for public transit development grants to keep Florida's growth in transit ridership over the last five years among the best in the country.
- ▶ \$159 million for safety initiatives to continue to improve the safety of families and visitors on our roads.
- ▶ \$46.6 million for bike and pedestrian trails to keep Florida's trail development among the best in the country.



### **Economic Development Transportation Fund**

The Economic Development Transportation Fund, commonly referred to as the "Road Fund," is an incentive tool designed to alleviate transportation problems that adversely impact a specific company's location or expansion decision. The award amount is based on the number of new and retained jobs and the eligible transportation project costs, up to \$3 million. The award is made to the local government on behalf of a specific business for public transportation improvements.

### **The Transportation Regional Incentive Program (TRIP)**

The TRIP fund was created as part of major Growth Management legislation enacted during the 2005 Legislative Session (SB 360). The purpose of the program is to encourage regional planning by providing state matching funds for improvements to regionally significant transportation facilities identified and prioritized by regional partners. Eligible partners must form a regional transportation area, pursuant to an interlocal agreement, and develop a regional transportation plan that identifies and prioritizes regionally significant facilities. To qualify for TRIP



funding, partners must sign an interlocal agreement that:

- ▶ Includes development of the regional transportation plan
- ▶ Delineates the boundaries of the regional transportation area
- ▶ Provides the duration of the agreement and how it may be changed
- ▶ Describes the planning process, and defines a dispute resolution process

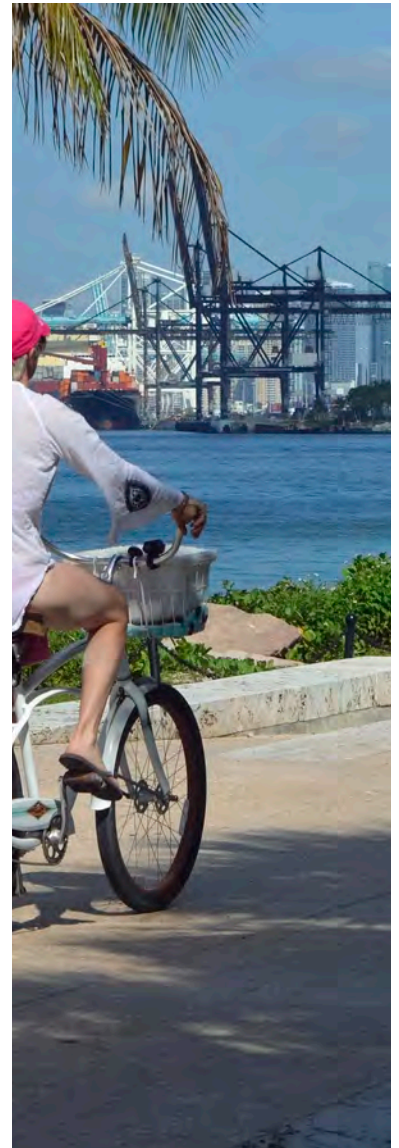
TRIP funds are to be used to match local or regional funds up to 50% of the total project costs for public transportation projects. In-kind matches such as right of way donations and private funds made available to the regional partners are also allowed. Federal funds attributable to urbanized areas over 200,000 in population may also be used for the local/regional match.

### FDOT Programs

The Florida Department of Transportation (FDOT) Safety Office funds subgrants that address traffic safety priority areas including:

- ▶ Aging Road Users
- ▶ Community Traffic Safety
- ▶ Impaired Driving
- ▶ Motorcycle Safety
- ▶ Occupant Protection and Child Passenger Safety
- ▶ Pedestrian and Bicycle Safety
- ▶ Police Traffic Services
- ▶ Speed and Aggressive Driving
- ▶ Teen Driver Safety
- ▶ Traffic Records
- ▶ Traffic Record Coordinating Committee (TRCC)
- ▶ Subgrants may be awarded for assisting in addressing traffic safety deficiencies, expansion of an ongoing activity, or development of a new program.

Grants are awarded to state and local safety-related agencies as “seed” money to assist in the development and implementation of programs that address traffic safety deficiencies or expand



ongoing safety programs activities in safety priority program areas. Funding for these grants are apportioned to states annually from the National Highway Traffic Safety Administration (NHTSA) according to a formula based on population and road mileage. Funding may be available for projects in other program areas if there is documented evidence of an identified problem.

Through the public rule making processes conducted in 1982, 1988, 1995 and 1998, it has been determined that certain highway safety program areas have proven to be more effective than others in reducing traffic crashes, injuries, and fatalities. These programs, designated as National Priority Program Areas are: Impaired Driving, Police Traffic Services, Speed Control, Occupant Protection/Child Passenger Safety, Pedestrian and Bicycle Safety, Motorcycle Safety, Traffic Records, and Community Traffic Safety.

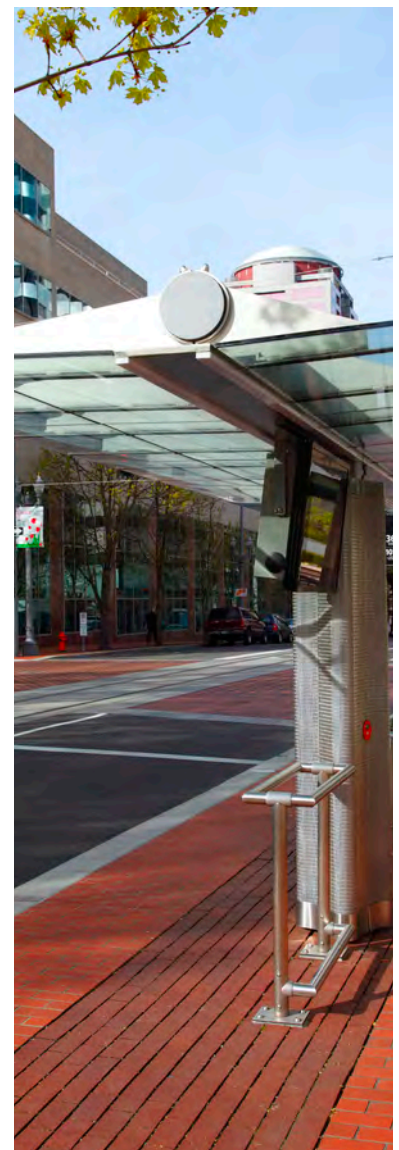
It is expected that programs funded through these grants will become self-sufficient and continue when grant funding terminates. To promote self-sufficiency, agencies are expected to provide a local funding match when personnel costs are included in second and third year projects. The local match is normally 25% of eligible costs for second year projects and 50% for third year projects.

Government agencies, political “subdivisions” of the state, local city and county government agencies, state colleges and state universities, school districts, fire departments, public emergency services providers, and certain qualified non-profit organizations are eligible to receive traffic safety grant funding.

These grants are awarded on a Federal fiscal year basis, and can be funded for a maximum of three consecutive years in a given priority area.

### Federal Programs

Federal programs make up the bulk of the funding for large projects. This is so because state governments contribute to the federal government, which in turn provides those funds back to the state. Florida is a donor state, which means it receives less than it contributes each year. There are competitive grant programs which often require local matches.





The US Department of Transportation helps communities fund transportation projects by issuing grants to eligible recipients for planning, vehicle purchases, facility construction, operations, and other purposes. The USDOT administers this financial assistance according to federal transportation authorization, MAP-21. There are a large number of programs and grants within the Department of Transportation that support projects that enhance or relate to livability.

### Grants and Programs:

- ▶ Surface Transportation Improvement
- ▶ Accessibility to Disadvantaged Populations
- ▶ Fixed Guideway Systems
- ▶ Rail
- ▶ Surface Transportation Planning
- ▶ Bike/Pedestrian
- ▶ Marine Transport
- ▶ Air Transport
- ▶ Research & Miscellaneous

### Surface Transportation Program (STP)

The Surface Transportation Program (STP) is one of the main sources of flexible funding available for transit or highway purposes. STP provides the greatest flexibility in the use of funds. These funds may be used as capital funding for public transportation capital improvements, car and vanpool projects, fringe and corridor parking facilities, bicycle and pedestrian facilities, and intercity or intracity bus terminals and bus facilities. As funding for planning, these funds can be used for surface transportation planning activities, wetland mitigation, transit research and development, and environmental analysis. Other eligible projects under STP include transit safety improvements and most transportation control measures. STP funds are distributed among various population and programmatic categories within a State. Some program funds are made available to metropolitan planning areas containing urbanized areas over 200,000 population; STP funds are also set aside to areas under 200,000 and 50,000 population. The largest portion of STP funds may be used anywhere within the State to which they are apportioned. State and local governments are eligible for these funds.



### **Bus and Bus Facilities Program**

The Buses and Bus Related Equipment and Facilities program provides capital assistance for new and replacement buses, related equipment, and facilities. Eligible capital projects include the purchasing of buses for fleet and service expansion, bus maintenance and administrative facilities, transfer facilities, bus malls, transportation centers, intermodal terminals, park-and-ride stations, acquisition of replacement vehicles, bus rebuilds, bus preventive maintenance, passenger amenities such as passenger shelters and bus stop signs, accessory and miscellaneous equipment such as mobile radio units, supervisory vehicles, fare boxes, computers and shop and garage equipment. Funds are allocated on a discretionary basis. Eligible recipients include public bodies and agencies (transit authorities and other state and local public bodies and agencies thereof) including states, municipalities, other political subdivisions of states; public agencies and instrumentalities of one or more states; and certain public corporations, boards and commissions established under state law. Private companies engaged in public transportation and private non-profit organizations are eligible sub recipients of FTA grants.

### **Transportation, Community, and System Preservation Program**

The Transportation, Community, and System Preservation (TCSP) Program is a comprehensive initiative of research and grants to integrate transportation, community, and system preservation plans and practices that improve the efficiency of the transportation system of the United States; reduce environmental impacts of transportation; reduce the need for costly future public infrastructure investments; ensure efficient access to jobs, services, and centers of trade; and examine community development patterns and identify strategies to encourage private sector development patterns and investments that support these goals. States, metropolitan planning organizations, local governments, and tribal governments are eligible





## **Bicycle and Pedestrian Program**

The Federal Highway Administration's Bicycle and Pedestrian Program promotes bicycle and pedestrian transportation use, safety, and accessibility. The Program is responsible for implementing Federal transportation legislation and policy related to bicycling and walking. This is not a funding program. Pedestrian and bicycle projects and programs are eligible for almost all Federal-aid highway funding categories. Each State has a Bicycle and Pedestrian Coordinator in its State Department of Transportation to promote and facilitate non-motorized transportation, including developing pedestrian and bicycle facilities and public educational, promotional, and safety programs. Pedestrian and bicycle projects and programs are eligible for almost all Federal-aid highway funding categories. Applicants should consult program eligibility criteria available in their State. The State Bicycle and Pedestrian Coordinators can help with questions specific to each State.

## **Transportation Enhancement Activities**

Transportation Enhancement (TE) activities offer funding opportunities to expand transportation choices and enhance the transportation experience through 12 eligible TE activities related to surface transportation, including pedestrian and bicycle infrastructure and safety programs, scenic and historic highway programs, landscaping and scenic beautification, historic preservation, and environmental mitigation. TE projects must relate to surface transportation and must qualify under one or more of the 12 eligible categories. Each State develops its own procedures to solicit and select projects for funding. States may make funds available to Federal, Tribal, State, or local government agencies. A few States allow private nonprofit organizations to apply in partnership with a government agency.

## **Transportation Alternative Program**

The Transportation Alternative Program was developed as a result of the Moving Ahead for Progress in the 21st Century (MAP-21). Eligible activities for funding include: 1. Construction, planning and design of on and off road facilities for bicyclists, pedestrians, and other forms of non-motorized transportation; 2. Construction, planning and design of infrastructure related projects/systems to provide safe routes for non-drivers; 3. Conversion and use of abandoned railroad corridors for non-motorized use; 4. Construction of turnouts, overlooks, and viewing areas under community improvement activities; 5. Inventory, control or removal of outdoor advertising; 6. Historic preservation and rehabilitation of historic transportation facilities; 7. Vegetation management practices in transportation rights of way; 8. Archeological activities related to impacts from transportation projects eligible under Title 23; and 9 Environmental mitigation activities.

As a cost reimbursement program, projects must go through multiple levels of review and

approval to become eligible for reimbursement. Once the Federal Highway Administration (FHWA) has authorized a project, project costs may be incurred and ultimately reimbursed. Costs incurred prior to FHWA authorization are not eligible for reimbursement. In addition, the Safe Routes to School (SRTS) Program and Recreational Trails Program (RTP) were both consolidated within the nine (9) activities under the TAP. The planning, designing, and constructing of boulevards and other roadways largely in the right of way of former Interstate System routes or other divided highways are also eligible as well.

### **The Safe Routes to School Program**

The purpose of the Safe Routes to School (SRTS) Program is to enable and encourage children, including those with disabilities, to walk and bicycle to school; to make walking and bicycling to school safe and more appealing; and to facilitate the planning, development and implementation of projects that will improve safety, and reduce traffic, fuel consumption, and air pollution in the vicinity of schools. The SRTS Program makes funding available for a wide variety of programs and projects, from building safer street crossings to establishing programs that encourage children and their parents to walk and bicycle safely to school. The Federal-aid Safe Routes to School program was created by Section 1404 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act. The SRTS Program is funded at \$612 million and provides Federal-aid highway funds to State highway agencies over five fiscal years (FY 2005- 2009), in accordance with a formula specified in the legislation. Funding which was unspent has been carried over, resulting in available funding in Florida. The national SRTS program is federally funded, but managed and administered by each State Department of Transportation (DOT). Funds are made available for infrastructure and non-infrastructure projects, and to administer Safe Routes to School programs that benefit elementary and middle school children in grades K-8. Each State is responsible for hiring a full-time Safe Routes to School Coordinator to implement a SRTS statewide program.

### **Recreational Trails Program**

The Recreational Trails Program, (RTP) provides funds to the States to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Each State develops its own procedures to solicit and select projects for funding. States may make funds available to Federal, Tribal, State, or local government agencies. Some States allow private nonprofit organizations to apply directly.







## VII. Conclusion

**A cultural shift towards walking, biking and large capacity vehicles is critical, if not inevitable, in order to maintain smooth mobility on Key Biscayne.**

Transportation and mobility are the foundations of moving people and goods through a system. All systems have capacities. Not unlike a water pipe, which is much more well defined in terms of capacity, a certain diameter pipe carries a certain number of gallons per hour. The roadway network is similar. As the number of vehicles reaches the maximum roadway capacity, the system slows down. The good thing about transportation on Key Biscayne, is that we have not really begun to tap the capacity of the sidewalks and bikeways, and utilize multiple occupancy vehicles, this would allow more efficient use the roadways. Whether the cultural shift away from the single occupancy automobile happens naturally or is incentivized, it is a key policy aspect of this project.

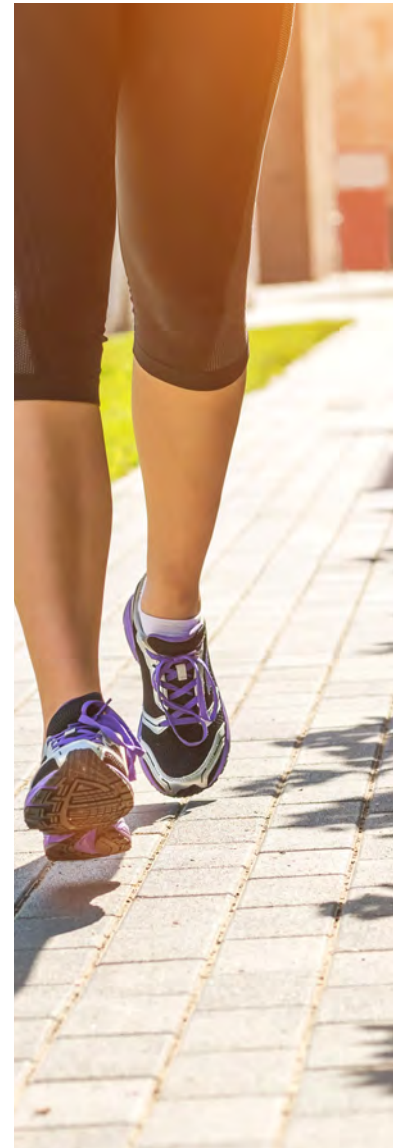
Transportation solutions have been developed into internal and external categories of projects. Internal efforts will be easier to implement and should be undertaken annually as part of the Villages budgeting process. External solutions should be evaluated and initiated though coordination with external agencies and governments. A technically viable project will not necessarily gain approval when negotiations begin. We recognize that there are some items which overlap, such as the various potential projects along the Rickenbacker Causeway.

In moving forward, Key Biscayne's traffic issues are not likely to go away. Rather, the expectation is that the of choices which currently do not exist will allow for growth in vehicular traffic to be properly managed. It is neither reasonable nor realistic to believe

that in the short term, long range travel from Key Biscayne to other parts of Miami-Dade County can be easily serviced by regional transit. Vehicular travel to places such as the airport, and further destinations, will most likely require vehicles for which future planning on the Rickenbacker Causeway must accommodate. Addressing periodic issues with mid-range travel to places such as Coconut Grove and Downtown Miami will require thorough thought and cooperation with entities outside of Key Biscayne. This intergovernmental aspect of development will have to result from collective policy development, a process which understandably will have to involve the consideration of tradeoffs and compromise between all parties. To assume that this, too, will occur without considerable time and monies is unrealistic.

What is more realistic is ensuring that choices made today which allow travel for where driving is not a necessity. Short trips within the community, provided appropriate infrastructure, do not require driving, rather the usage of the private automobile is a conscious “choice,” albeit one with community consequences. Of course, choice is a relative word, one contingent on the ability of alternatives to be viable; in Key Biscayne, the aim in the future is to ensure the viability of safe bicycling and walking through the implementation of appropriate infrastructure. While completing the pedestrian network has historically been one fraught with local opposition, it is time to recognize that there are consequences to each policy decision, and the Village must take ownership of such consequences moving forward.

Without completing the pedestrian infrastructure, surely some property owners will be appeased, but that comes at a cost to the safety and ability to walk for the greater community, and those who come after as people enter and leave the Village. While the Village can provide increased parking, easing driving issues will make that mode of travel much more attractive, thereby incentivizing that choice. Comfort and effort would be satisfied, and perhaps lowered, but at the cost of perhaps encouraging short term driving. Comfort, cost, safety and other factors are not always complimentary, and while they do not always require





tradeoffs, they do at times require holistic considerations in our decision-making processes. How we address the interplay of each factor in our choices creates, in turn, the alternatives by which an intermodal system works. Decisions at the policy level thus affect future mobility through its influence on choice.

A cultural shift, enabling and encouraging people to move about the community without a car, is one that is naturally occurring in society today, necessitated by the roadway system reaching a critical mass, and running out of capacity. The shift is inevitable, because continued expansion of the roadway network is costly, both in financial, and political terms. What is changeable through action or inaction is the speed by which this shift occurs.

This shift can be accelerated through the implementation of the multimodal infrastructure and projects presented in this report. As stated in the onset of this project, managing expectations is critical. The change is incremental. In all likelihood, roadway congestion may never improve (but it will get worse more slowly than it would if not treated at all), as the desire to drive is pervasive, and the freed up roadway capacity gained with these multimodal options will likely be consumed by more cars. Ultimately, more people will be moving about the community faster than they would otherwise, because the additional capacity needed to accommodate them will be built in to the pedestrian, bicycle and transit systems, and supplemented by services and policies. Quality of life will increase.

It is not within the purview of this study to dictate such paths for the Village, but rather, to light the way by noting the issues and the requirements to fix those issues. What is acceptable and not acceptable, has always, through the various studies, been within the full purview of the Village and its decision making bodies. Decisive action one way or decisive inaction will pave the way for calculated choices for the future of the Village of Key Biscayne.

